Bachelor of Science (Hons.) in

Medical Laboratory Technology (Techniques)

Program code: SAH0104H

(2021 - 2024)

Program and Course Structure

School of Allied Health Sciences

Vision of the University

To serve the society by being a global University of higher learning in pursuit of academic excellence, innovation and nurturing entrepreneurship.

Mission of the University

1. Transformative educational experience
2. Enrichment by educational initiatives that encourage global outlook
3. Develop research, support disruptive innovations and accelerate entrepreneurship
4. Seeking beyond boundaries

Core Values

- Integrity
- Leadership
- Diversity
- Community

Vision of the School

To steer the School of Allied Health Sciences towards excellence in academics, innovation and entrepreneurship by constant endeavors.

Mission of the School

1. To create the state-of-the-art facility for quality teaching learning, research & innovation
2. To incorporate the contemporary standards in teaching & learning
3. To inculcate in the students' values of integrity and compassion towards the care of patients and society.

Core Values

- Critical Thinking and Observation
- Analytical Skills
- Creativity
- Skilled professional
- Multidimensional
- Compassion
- Management

BMLT-Honors Programme Educational Objectives (PEO)

A under graduate student having qualified the BSc Medical Laboratory Technology examination should be able to:

PEO1: Acquire comprehensive knowledge of structure and functions of human body, physiological and biochemical mechanisms involved in normal and abnormal health condition, knowledge of light microscopic and ultrastructure of human specimen. Knowledge of structure and functional correlation of blood constituents with disease process and be able to communicate the same clearly and with precision.

PEO2: Be aware of contemporary advances and developments in the field of medical laboratory sciences.

PEO3: Acquire knowledge of modern research techniques and be familiar with the recent advances in medical laboratory tests.

PEO4: Inculcate habit of scientific enquiry and be able to identify lacunae in the existing knowledge in a given area.

PEO5: Have acquired skills in interpreting the results to medical and paramedical professionalsas Laboratory manager/ supervisor or health care administrator.

PEO6: Have acquired skills in effectively communicating with the students and colleagues from various medical and paramedical fields as educational consultant or laboratory coordinator etc.

PEO7: Have acquired skills of integrating laboratory tests with other disciplines of medical sciences as and when needed.

BMLT-Honors Map PEOs with Mission Statements:

PEO Statements	School Mission 1	School Mission 2	School Mission 3
PEO1:	3	3	3
PEO2:	3	2	3
PEO3:	3	3	3
PEO4:	2	3	2
PEO5:	3	2	3
PEO6:	2	3	3
PEO7:	3	2	3

Enter correlation levels 1, 2, or 3 as defined below:

1. **Slight (Low)** **2. Moderate (Medium)** **3. Substantial (High)** **4. No correlation (--)**

BMLT-HonorsProgram Outcomes (PO's)

Programme Specific Outcomes: The graduate attributes of BSc Medical laboratory technology of SAHS are as follows:

PO1 : Knowledge of laboratory tests: Posses theoretical and practical knowledge of the laboratory test associated with diagnosis of diseases including biochemical, pathological and microbiological test in the laboratory.

PO2 : Thinking abilities: Utilize the principles of scientific test, thinking analytically, clearly and critically, while solving laboratory problems and making patient reports after sample processing in daily practice.

PO3 : Planning abilities: Demonstrate effective planning abilities including laboratory tests timing management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

PO4 : Professional identity: Understand, analyses and communicate the value of their professional roles in society (e.g. health care professionals, laboratory supervisors and managers) through consideration of social, economic and health issues.

PO5: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the laboratory practice.

PO6: Lifelong learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of medical laboratory change.

Mapping of Program Outcome vs. Program Educational Objectives

	PEO1	PEO2	PEO3	PEO4	PEO5	PEO6	PEO7
PO1	3	3	3	3	3	3	3
PO2	3	3	2	3	3	3	3
PO3	3	3	3	3	3	3	3
PO4	3	3	3	3	3	3	3
PO5	3	3	3	3	2	3	3
PO6	3	3	2	3	3	3	2

1. Slight (Low) ***2. Moderate (Medium)*** ***3. Substantial (High)***

BMLT-Honors Program Outcome Vs. Courses Mapping Table:

Program Outcome Courses	Course code	Course Name		PO1	PO2	PO3	PO4	PO5	PO6
Semester-1									
Theory									
Course 1.1	BMH 106	BIOCHEMISTRY- I	CO1	3	3	3	3	3	3
			CO2	3	2	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 1.2	BMH 107	PATHOLOGY- I	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	2	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 1.3	BMH 108	MICROBIOLOGY-I	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	2	3	3	2	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 1.4	BMH 109	HUMAN ANATOMY-I	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 1.5	BMH 110	HUMAN PHYSIOLOGY-I	CO1	3	3	3	3	3	3

			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 1.6	BMH011	ENGLISH-I	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Practical									
Course 1.7	BMH 156	BIOCHEMISTRY- I (LAB)	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 1.8	BMH 157	PATHOLOGY- I (LAB)	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 1.9	BMH 158	MICROBIOLOGY-I (LAB)	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 1.10	BMH 159	HUMAN ANATOMY-I (LAB)	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3

			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 1.11	BMH 150	HUMAN PHYSIOLOGY-I (LAB)	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Semester 2									
Theory									
Course 2.1	BMH111	BIOCHEMISTRY- II	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 2.2	BMH112	PATHOLOGY- II	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	2	3	3	3
			CO5	3	3	3	3	2	3
Course 2.3	BMH113	MICROBIOLOGY-II	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 2.4	BMH114	HUMAN ANATOMY-II	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3

			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 2.5	BMH115	HUMAN PHYSIOLOGY-II	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Practical									
Course 2.6	BMH 151	BIOCHEMISTRY- II (LAB)	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 2.7	BMH 152	PATHOLOGY- II (LAB)	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 2.8	BMH 153	MICROBIOLOGY-II (LAB)	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 2.9	BMH 154	HUMAN ANATOMY-II (LAB)	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3

			CO5	3	3	3	3	2	3
Course 2.10	BMH 155	HUMAN PHYSIOLOGY-II (LAB)	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Semester 3									
Theory									
Course 3.1	BMH206	BIOCHEMISTRY- III	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 3.2	BMH207	PATHOLOGY- III	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 3.3	BMH208	MICROBIOLOGY-III	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 3.4	BMH 022	ENGLISH-II	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3

Practical									
Course 3.5	BMH 251	BIOCHEMISTRY- III (LAB)	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 3.6	BMH 252	PATHOLOGY- III (LAB)	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 3.7	BMH 253	MICROBIOLOGY-III (LAB)	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Semester 4									
Theory									
Course 4.1	BMH209	BIOCHEMISTRY- IV	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 4.2	BMH210	PATHOLOGY- IV	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3

			CO5	3	3	3	3	2	3
Course 4.3	BMH211	MICROBIOLOGY-IV	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 4.4	BMH 033	Clinical Pharmacology	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Practical									
Course 4.5	BMH 254	BIOCHEMISTRY- IV (LAB)	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 4.6	BMH 255	PATHOLOGY- IV (LAB)	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 4.7	BMH 256	MICROBIOLOGY-IV (LAB)	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3

Semester 5									
Theory									
Course 5.1	BMH306	BIOCHEMISTRY- V	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 5.2	BMH307	PATHOLOGY- V	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 5.3	BMH308	MICROBIOLOGY-V	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 5.4	BMH 044	Forensic science	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Practical									
Course 5.5	BMH 351	BIOCHEMISTRY- V (LAB)	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3

Course 5.6	BMH 352	PATHOLOGY- V (LAB)	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 5.7	BMH 353	MICROBIOLOGY-V (LAB)	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Semester 6									
Theory									
Course 6.1	BMH309	BIOCHEMISTRY- VI	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 6.2	BMH310	PATHOLOGY- VI	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 6.3	BMH311	MICROBIOLOGY-VI	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3

Course 6.4	BMH055	Research Methodology	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Practical									
Course 6.5	BMH 354	BIOCHEMISTRY- VI (LAB)	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 6.6	BMH 355	PATHOLOGY- VI (LAB)	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3
Course 6.7	BMH 356	MICROBIOLOGY-VI (LAB)	CO1	3	3	3	3	3	3
			CO2	3	3	2	3	3	3
			CO3	3	3	3	3	3	3
			CO4	3	3	3	3	3	3
			CO5	3	3	3	3	2	3

SHARDA UNIVERSITY

School of Allied Health Sciences

Program: B.Sc. in Medical Laboratory Technology (Techniques) - Honors

Semester/Term.: 1

Session: 2021-22

S. No.	Paper ID	Subject Code	Subjects	Teaching Load			Credits	Core/Elective Pre-Requisite/ Co Requisite	Type of Course: CC AECC SEC DSE
				L	T	P			
THEORY									
1.	35592	BMH 106	BIOCHEMISTRY- I	2	1	-	3	Core	CC
2.	35593	BMH 107	PATHOLOGY- I	2	1	-	3	Core	CC
3.	35594	BMH 108	MICROBIOLOGY-I	2	1	-	3	Core	CC
4.	35595	BMH 109	HUMAN ANATOMY-I	2	1	-	3	Core	CC,AECC
5.	35596	BMH 110	HUMAN PHYSIOLOGY-I	2	1	-	3	Core	CC,AECC
6.	35597	BMH011	English-I	2	-	-	2	Pre-requisite	SEC
Practical									
1.	35598	BMH 156	BIOCHEMISTRY- I (LAB)	-	-	2	1	Core	CC,SEC
2.	35599	BMH 157	PATHOLOGY- I (LAB)	-	-	2	1	Core	CC,SEC
3.	35600	BMH 158	MICROBIOLOGY-I (LAB)	-	-	2	1	Core	CC,SEC
4.	35601	BMH 159	HUMAN ANATOMY-I (LAB)	-	-	2	1	Core	CC,SEC
5.	35602	BMH 150	HUMAN PHYSIOLOGY-I (LAB)	-	-	2	1	Core	CC,SEC
TOTAL CREDITS							**22**		

SHARDA UNIVERSITY

School of Allied Health Sciences

Program: B.Sc. in Medical Laboratory Technology (Techniques)- Honors

Semester/Term.: 2

Session: 2021-22

S. No.	Paper ID	Subject Code	Subjects	Teaching Load			Credits	Core/Elective Pre-Requisite/ Co Requisite	Type of Course: CC AECC SEC DSE
				L	T	P			
THEORY									
1	35624	BMH111	BIOCHEMISTRY- II	2	1	-	3	Core	CC
2	35625	BMH112	PATHOLOGY- II	2	1	-	3	Core	CC
3	35626	BMH113	MICROBIOLOGY-II	2	1	-	3	Core	CC
4	35627	BMH114	HUMAN ANATOMY-II	2	1	-	3	Core	CC,AECC
5	35628	BMH115	HUMAN PHYSIOLOGY-II	2	1	-	3	Core	CC,AECC
		OPE	Open Elective course	2	-	-	2	Elective	AECC, SEC
Practical									
6.	35629	BMH151	BIOCHEMISTRY- II(LAB)	-	-	2	1	Core	CC,SEC
7.	35630	BMH152	PATHOLOGY- II(LAB)	-	-	2	1	Core	CC,SEC
8.	35631	BMH153	MICROBIOLOGY-II(LAB)	-	-	2	1	Core	CC,SEC
9.	35632	BMH154	HUMAN ANATOMY-II(LAB)	-	-	2	1	Core	CC,SEC
10.	35633	BMH155	HUMAN PHYSIOLOGY-II(LAB)	-	-	2	1	Core	CC,SEC
TOTAL CREDITS							**22**		

SHARDA UNIVERSITY

School of Allied Health Sciences

Program: B.Sc. in Medical Laboratory Technology (Techniques)- Honors

Semester/Term: 3

Session: 2022-23

S. No.	Paper ID	Subject Code	Subjects	Teaching Load			Credits	Core/Elective Pre-Requisite/ Co Requisite	Type of Course[1]: CC AECC SEC DSE
				L	T	P			
THEORY									
1	35729	BMH206	BIOCHEMISTRY- III	2	2	-	4	Core	CC
2	35730	BMH207	PATHOLOGY- III	2	2	-	4	Core	CC
3	35731	BMH208	MICROBIOLOGY-III	2	2	-	4	Core	CC
4	35732	BMH 022	English-II	2	1	-	3	Pre-requisite	SEC
Practical									
5	35733	BMH251	BIOCHEMISTRY- III(LAB)	-	-	2	1	Core	CC,SEC
6	35734	BMH252	PATHOLOGY- III(LAB)	-	-	2	1	Core	CC,SEC
7	35735	BMH253	MICROBIOLOGY-III(LAB)	-	-	2	1	Core	CC,SEC
TOTAL CREDITS							**18**		

[1] CC: Core Course, AECC: Ability Enhancement Compulsory Courses, SEC: Skill Enhancement Courses, DSE: Discipline Specific Courses

SHARDA UNIVERSITY

School of Allied Health Sciences

Program: B.Sc. in Medical Laboratory Technology (Techniques) - Honors

Semester/Term: 4

Session: 2022-23

S. No.	Paper ID	Subject Code	Subjects	Teaching Load			Credits	Core/Elective Pre-Requisite/ Co Requisite	Type of Course[2]: CC AECC SEC DSE
				L	T	P			
THEORY									
1		BMH209	BIOCHEMISTRY- IV	2	2	-	4	Core	CC
2		BMH210	PATHOLOGY- IV	2	2	-	4	Core	CC
3		BMH211	MICROBIOLOGY-IV	2	2	-	4	Core	CC
4		BMH 033	Clinical Pharmacology	2	1	-	3	Pre-requisite	SEC
Practical									
5		BMH254	BIOCHEMISTRY- IV(LAB)	-	-	2	1	Core	CC,SEC
6		BMH255	PATHOLOGY- IV(LAB)	-	-	2	1	Core	CC,SEC
7		BMH256	MICROBIOLOGY-IV(LAB)	-	-	2	1	Core	CC,SEC
TOTAL CREDITS							**18**		

[2] CC: Core Course, AECC: Ability Enhancement Compulsory Courses, SEC: Skill Enhancement Courses, DSE: Discipline Specific Courses

SHARDA UNIVERSITY

School of Allied Health Sciences

Program: B.Sc. in Medical Laboratory Technology (Techniques) - Honors

Semester/Term.: 5

Session: 2023-24

S. No.	Paper ID	Subject Code	Subjects	Teaching Load			Credits	Core/Elective Pre-Requisite/ Co Requisite	Type of Course[3]: CC AECC SEC DSE
				L	T	P			
THEORY									
1	35722	BMH306	BIOCHEMISTRY- V	2	2	-	4	Core	CC
2	35723	BMH307	PATHOLOGY- V	2	2	-	4	Core	CC
3	35724	BMH308	MICROBIOLOGY-V	2	2	-	4	Core	CC
4	35725	BMH 044	Forensic science	2	1	-	3	Pre-requisite	SEC
PRACTICAL									
5	35726	BMH351	BIOCHEMISTRY- V(LAB)	-	-	2	1	Core	CC,SEC
6	35727	BMH352	PATHOLOGY- V(LAB)	-	-	2	1	Core	CC,SEC
7	35728	BMH353	MICROBIOLOGY-V(LAB)	-	-	2	1	Core	CC,SEC
TOTAL CREDITS							**18**		

[3] CC: Core Course, AECC: Ability Enhancement Compulsory Courses, SEC: Skill Enhancement Courses, DSE: Discipline Specific Courses

SHARDA UNIVERSITY

School of Allied Health Sciences

Program: B.Sc. in Medical Laboratory Technology (Techniques) - Honors

Semester/Term.: 6

Session: 2023-24

S. No.	Paper ID	Subject Code	Subjects	Teaching Load			Credits	Core/Elective Pre-Requisite/ Co Requisite	Type of Course[4]: 1. CC 2. AECC 3. SEC 4. DSE
				L	T	P			
THEORY									
1		BMH309	BIOCHEMISTRY- VI	2	2	-	4	Core	CC
2		BMH310	PATHOLOGY- VI	2	2	-	4	Core	CC
3		BMH311	MICROBIOLOGY-VI	2	2	-	4	Core	CC
4		BMH 055	Research Methodology	2	1	-	3	Pre-requisite	SEC
PRACTICAL									
5		BMH354	BIOCHEMISTRY- VI(LAB)	-	-	2	1	Core	CC,SEC
6		BMH 355	PATHOLOGY- VI(LAB)	-	-	2	1	Core	CC,SEC
7		BMH 356	MICROBIOLOGY-VI(LAB)	-	-	2	1	Core	CC,SEC
TOTAL CREDITS							**18**		

[4] CC: Core Course, AECC: Ability Enhancement Compulsory Courses, SEC: Skill Enhancement Courses, DSE: Discipline Specific Courses

SHARDA UNIVERSITY

School of Allied Health Sciences

Program: B.Sc. in Medical Laboratory Technology (Techniques) - Honors

Semester/Term.: 7

Session: 2024-25

S.NO.	PAPER ID	SUBJECT CODE	COURSE	Practical hours	CREDITS
	Internship in Hospital for 12 months			**80**	**40**
	Total			**80**	**40**

Table1:Evaluation scheme of B.Sc. in Medical Laboratory Technology(Techniques) - Honors 1st semester University examination:

S.No.	Paper ID	Subject Code	Subject Name	EVALUATION SCHEME (Distribution of Marks)			Total Marks
				Continuous Assessment	Mid Term Examination	End Term Examination	
THEORY SUBJECTS							
1		BMH 106	BIOCHEMISTRY- 1	30	20	50	100
2		BMH 107	PATHOLOGY- 1	30	20	50	100
3		BMH 108	MICROBIOLOGY-1	30	20	50	100
4		BMH 109	HUMAN ANATOMY-1	30	20	50	100
5		BMH 110	HUMAN PHYSIOLOGY-1	30	20	50	100
6		BMH 011	English-1	50			
PRACTICAL SUBJECTS							
1		BMH 156	BIOCHEMISTRY- I (LAB)	60	-	40	100
2		BMH 157	PATHOLOGY- I (LAB)	60	-	40	100
3		BMH 158	MICROBIOLOGY-I (LAB)	60	-	40	100
4		BMH 159	HUMAN ANATOMY-I (LAB)	60	-	40	100
5		BMH 150	HUMAN PHYSIOLOGY-I (LAB)	60	-	40	100
						Grand Total [5 (Th) +5(Pr)]	1000

Note: English-I will be the subsidiary subject and marks will convert into grade.

Table 2.Evaluation scheme of B.Sc. in Medical Laboratory Technology(Techniques)- Honors 2nd semester University examination:

S.No	Paper ID	Subject Code	Subject Name	EVALUATION SCHEME (Distribution of Marks)			Total Marks
				Continuous Assessment	Mid Term Examination	End Term Examination	
THEORY SUBJECTS							
1		BMH111	BIOCHEMISTRY- II	30	20	50	100
2		BMH112	PATHOLOGY- II	30	20	50	100
3		BMH113	MICROBIOLOGY-II	30	20	50	100
4		BMH114	HUMAN ANATOMY-II	30	20	50	100
5		BMH115	HUMAN PHYSIOLOGY-II	30	20	50	100
6		OPE	Open Elective course	-	-	-	-
PRACTICAL SUBJECTS							
1		BMH151	BIOCHEMISTRY- II(LAB)	60	-	40	100
2		BMH152	PATHOLOGY- II(LAB)	60	-	40	100
3		BMH153	MICROBIOLOGY-II(LAB)	60	-	40	100
4		BMH154	HUMAN ANATOMY-II(LAB)	60	-	40	100
5		BMH155	HUMAN PHYSIOLOGY-II(LAB)	60	-	40	100
						Grand Total [5 (Th) +5(Pr)]	1000

Note: Open elective course will be in audit mode and student will have to pass it.

Table 3.Evaluation scheme of B.Sc. in Medical Laboratory Technology(Techniques)– Honors 3rd semester University examination:

S.No	Paper ID	Subject Code	Subject Name	EVALUATION SCHEME (Distribution of Marks)			Total Marks
				Continuous Assessment	Mid Term Examination	End Term Examination	
THEORY SUBJECTS							
1		BMH206	BIOCHEMISTRY- III	30	20	50	100
2		BMH207	PATHOLOGY- III	30	20	50	100
3		BMH208	MICROBIOLOGY-III	30	20	50	100
4		BMH 022	English-II	50	-	-	-
PRACTICAL SUBJECTS							
1		BMH251	BIOCHEMISTRY- III(LAB)	60	-	40	100
2		BMH252	PATHOLOGY- III(LAB)	60	-	40	100
3		BMH253	MICROBIOLOGY-III(LAB)	60	-	40	100
						Grand Total [3 (Th) +3(Pr)]	600

Note: English-II will be the subsidiary subject and marks will convert into grade.

Table 4.Evaluation scheme of B.Sc. in Medical Laboratory Technology(Techniques)-

Honors4th semester University examination:

S.No	Paper ID	Subject Code	Subject Name	EVALUATION SCHEME (Distribution of Marks)			Total Marks
				Continuous Assessment	Mid Term Examination	End Term Examination	
THEORY SUBJECTS							
1		BMH209	BIOCHEMISTRY- IV	30	20	50	100
2		BMH210	PATHOLOGY- IV	30	20	50	100
3		BMH211	MICROBIOLOGY-IV	30	20	50	100
4		BMH 033	Clinical Pharmacology	50	-	-	-
5		OPE	Open elective course	-	-	-	-
PRACTICAL SUBJECTS							
1		BMH254	BIOCHEMISTRY- IV (LAB)	60	-	40	100
2		BMH255	PATHOLOGY- IV (LAB)	60	-	40	100
3		BMH256	MICROBIOLOGY-IV (LAB)	60	-	40	100
						Grand Total [3 (Th) +3(Pr)]	600

Note: Clinical Pharmacology will be the subsidiary subject and marks will convert into grade.

Table 5.Evaluation scheme of B.Sc. in Medical Laboratory Technology(Techniques) -

Honors 5thsemester University examination:

S.No	Paper ID	Subject Code	Subject Name	EVALUATION SCHEME (Distribution of Marks)			Total Marks
				Continuous Assessment	Mid Term Examination	End Term Examination	
THEORY SUBJECTS							
1		BMH306	BIOCHEMISTRY- V	30	20	50	100
2		BMH307	PATHOLOGY- V	30	20	50	100
3		BMH308	MICROBIOLOGY-V	30	20	50	100
4		BMH 044	Forensic science	50	-	-	
PRACTICAL SUBJECTS							
1		BMH351	BIOCHEMISTRY- V(LAB)	60	-	40	100
2		BMH352	PATHOLOGY- V(LAB)	60	-	40	100
3		BMH353	MICROBIOLOGY- V (LAB)	60	-	40	100
						Grand Total [3 (Th) + 3(Pr)]	600

Note: Forensic science will be the subsidiary subject and marks will convert into grade.

Table 6.Evaluation scheme of B.Sc. in Medical Laboratory Technology(Techniques)-

Honors 6th semester University examination:

S.No	Paper ID	Subject Code	Subject Name	EVALUATION SCHEME (Distribution of Marks)			Total Marks
				Continuous Assessment	Mid Term Examination	End Term Examination	
THEORY SUBJECTS							
1		BMH309	BIOCHEMISTRY- VI	30	20	50	100
2		BMH310	PATHOLOGY- VI	30	20	50	100
3		BMH311	MICROBIOLOGY-VI	30	20	50	100
5		BMH 055	Research methodology	50	-	-	-
6			Open elective course	-	-	-	-
	PRACTICALS						
7		BMH354	BIOCHEMISTRY- VI(LAB)	60	-	40	100
8		BMH355	PATHOLOGY- VI(LAB)	60	-	40	100
9		BMH356	MICROBIOLOGY-VI(LAB)	60	-	40	100
						Grand Total [3 (Th) + 3(Pr)]	600

Note: English –I, English –II, Clinical Pharmacology, Forensic Science and Research Methodology will be the subsidiary subject and marks will convert into grade**.**

- **Value added courses are mandatory for each student of odd semester (List of VAC is enclosed as Annexure 1) and it is non-graded.**
- **Open elective course is mandatory for each student of even semester (List of approved open elective courses offered by the University are enclosed as Annexure 2 and it will be in audit mode and mandatory to pass it.**
- **In each academic session, project work will be provided to the students.**
- **B.Sc. in Medical Laboratory Technology- Honors7th semester/ 8th Semester** (Clinical training & internship is Non graded)

Course Structure
Of
Bachelor of Science in Medical Laboratory Technology (Techniques) - Honors

BMH 106: BIOCHEMISTRY- I&BMH 106: BIOCHEMISTRY- I (Lab)

School: SAHS		**Batch : 2020-23**	
Program: BMLT-Honors		**Current Academic Year: 2020-21**	
Branch: Medical Lab Technology-Honors		**Semester: 1**	
1	Course Code	**BMH 106**	
2	Course Title	**BIOCHEMISTRY -I**	
3	Credits	**3**	
4	Contact Hours (L-T-P)	**2-1-0**	
	Course Status	Compulsory	
5	Course Objective	• To train the students in the management of medical laboratory along with handling a variety of laboratory chemicals and instruments including electronic and advanced equipment's used in modern medical laboratories. • To make the students able to do routine laboratory testing under stipulated conditions. • To prepare specimens and operate machines that automatically analyse samples. • To provide the conceptual basis for understanding biochemical and particularly address the fundamental mechanisms of the biomolecules to facilitate the life. • To develop diagnostic skills in clinical biochemistry and to provide an advanced understanding of the core principles and topics of Biochemistry and their experimental basis.	
6	Course Outcomes	CO1: To understand the importance of sampling techniques CO2: To understand the importance of different types of glassware's CO3: To understand the importance of different types of equipment's CO4: To understand the importance of acid, base and buffer CO5: To understand the importance of chemistry of	

		carbohydrates and lipids	
7	Course Description	• Introduction of Glassware's • Introduction of Laboratory Equipment's • Safety of measurements in Laboratory, Sampling technique and its preservation • Preparation of Solutions • Acid, Base and Indicators • Nutrition • Carbohydrate Chemistry • Lipid Chemistry	
8	Outline syllabus **Theory**		CO mapping
	Unit 1	**Introduction of Glassware's and laboratory equipment's**	CO1
		a. Pipettes, Burettes, Beakers, Petri dishes, depression plates; Flasks - different types; Volumetric, round bottomed, Erlenmeyer conical etc. b. Water bath: Use, care and maintenance. Oven & Incubators. c. Refrigerators, cold box, deep freezers.Colorimeter and spectrophotometer.	
	Unit 2	**Safety of measurements in Laboratory, Sampling technique and its preservation**	CO2
		a. Different types of samples such as urine, blood, stool, tissue etc. and various techniques to preserve the samples. b. Preparation of percentageand normal solution. c. Preparation of molar and molal solution.	
	Unit 3	**Acid, Base, Indicators and Nutrition**	CO3
		a. Acid- base indicators: Definition, concept, mechanism of action. b. Importance of nutrition: Calorific values, Respiratory quotient, Energy requirement of a person - Basal metabolic rate. c. Balanced diet, recommended dietary allowances, Role of carbohydrates, lipid and protein in diet.	
	Unit 4	**Carbohydrate Chemistry**	CO4

		1. Definition, general classification with examples. 2. Glycosidic bond, Structures, composition, sources, properties and functions of Monosaccharide's and Disaccharides. 3. Structures, composition, sources, properties and functions of Oligosaccharides and Polysaccharides.	
	Unit 5	**Lipid Chemistry**	CO5
		a. Definition, classification, properties and functions of Fatty acids. b. Triacylglycerol and Phospholipids. c. Cholesterol, Essential fatty acids and their importance, Lipoprotein.	
1	**Course Code**	**BMH 156**	
2	**Course Title**	**BIOCHEMISTRY –I(LAB)**	
3	**Credits**	**1**	
4	**Contact Hours (L-T-P)**	**0-0-2**	
5	Course Outcomes	CO1: To understand the importance of sampling techniques CO2: To understand the importance of different types of glass wares CO3: To understand the importance of different types of equipment's CO4: To understand the importance of acid and base CO5: To understand the importance of buffers	
6	Course Description	• Introduction of Glassware's • Introduction of Laboratory Equipment's • Safety of measurements in Laboratory, • Preparation of Solutions • Determination of strength of acids and bases	
	Practical's		CO mapping
	Unit 1	a. Introduction to Laboratory apparatus -1 b. Introduction to Laboratory apparatus -2 c. Maintenance of Laboratory apparatus-3	CO1
	Unit 2	a. Introduction to Laboratory glassware's -1 b. Introduction to Laboratory glassware's -2	CO2

		c. Maintenance of Laboratory glassware's			
	Unit 3	a. Safety measurements in Biochemistry lab b. General laboratory protocols c. Awareness in a lab			CO3
	Unit 4	a. Preparation of acids of different concentration b. Preparation of bases of different concentration c. Preparation of solutions of different concentration			CO4
	Unit 5	a. Determination of the strength of NaOH solution b. Determination of the strength of HCl solution c. Determination of the strength of NH_4OH solution			CO5
	Mode of examination	Theory and Practical			
	Weightage Distribution for Theory	CA	MTE	ETE	
		30%	20%	50%	
	Weightage Distribution for Practical's	CA	MTE	ETE	
		60%	0%	40%	
	Text book/s*	1) A text book of Medical Biochemistry by Chatterjee&Shinde 2) Text book of biochemistry for Medical students by Vasudevan and Sreekumari 3) Biochemistry by Lehringer 4) Clinical chemistry by Varley 5) Harpers Illustrated Biochemistryby Robert K.M.			

School: SAHS		**Batch : 2020-23**	
Program: BMLT-Honors		**Current Academic Year: 2020-21**	
Branch: Medical Lab Technology-Honors		**Semester: 1**	
1	Course Code	**BMH 107**	
2	Course Title	**PATHOLOGY-I**	
3	Credits	**3**	
4	Contact Hours (L-T-P)	**2-1-0**	
	Course Status	Compulsory	
5	Course Objective	• To introduce basic principles and application relevance of clinical disease for students who are in preparation for laboratory technologists. • The content of rigorous course provides knowledge of the structure and function of the major organ systems, including the molecular, biochemical and cellular mechanisms for maintaining homeostasis. • It also provide knowledge of the pathogenesis of diseases, interventions for effective treatment, and mechanisms of health maintenance to prevent disease. • The student will be able to properly order and interpret hematologic and coagulation tests, including CBC's, PT's, INR's, and APTT's, for the proper diagnosis and effective treatment of	

		patients with hematologic, bleeding, and thrombotic disorders.	
6	Course Outcomes	CO1: To understand the importance of Haematology CO2: To understand the importance of Laboratory safety guidelines CO3: To understand the importance of Hb, PCV estimation CO4: To understand the importance of Section cutting and Biomedical waste management CO5: To understand the importance of Blood Bank	
7	Course Description	• Introduction to Haematology • Laboratory safety guidelines • Estimation of Bleeding time, Clotting time, Prothrombin time • Biomedical waste management • Blood bank	
8	Outline syllabus **Theory**		CO mapping
	Unit 1		
		1. Introduction to Haematology: Normal collection of blood, their structure and function. 2. Various anticoagulants used in Haematology 3. Various instruments and glassware'sused in Haematology	CO1
	Unit 2		
		1. Preparation and use of glassware's. 2. Laboratory safety guidelines 3. SI units and conventional units in hospital laboratory	CO2
	Unit 3		
		1. Hb, PCV, ESR & Normal haemostasis 2. Bleeding time, Clotting time, Prothrombin time 3. Activated partial thromboplastin time	CO3

	Unit 4		
		1. Section cutting and Tissue processing for routine paraffin sections 2. Decalcification of tissues & Staining of tissues – H& E staining 3. Biomedical waste management	CO4
	Unit 5		
		1. Introduction of Blood bank 2. Blood grouping and Rh types 3. Cross matching	CO5
	Course Code	**BMH 157**	
	Course Title	**PATHOLOGY –I(LAB)**	
	Credits	**1**	
	Contact Hours (L-T-P)	**0-0-2**	
	Course Outcomes	CO1: To understand the importance of Haematology CO2: To understand the importance of Laboratory safety guidelines CO3: To understand the importance of Hb, PCV estimation CO4: To understand the importance of Bleeding time CO5: To understand the importance of Clotting time	
	Course Description	• Introduction to Haematology • Laboratory safety guidelines • Estimation of Bleeding time • Estimation of Clotting time • Estimation of Hb andProthrombin time	
	Practical's		CO mapping
	Unit 1	a. Blood grouping and Rh typing in normal sample b. Blood grouping and Rh typing in patient sample c. Blood grouping and Rh typing in unknown sample	CO1
	Unit 2	a. Packed cell volume and Hb estimation in normal sample	CO2

		b. Packed cell volume and Hb estimation in patient sample c. Packed cell volume and Hb estimation in patient in unknown sample	
	Unit 3	a. Erythrocyte sedimentation rate in normal sample b. Erythrocyte sedimentation rate in patient sample c. Erythrocyte sedimentation rate in unknown sample	CO3
	Unit 4	a. Bleeding time estimation in normal sample b. Bleeding time estimation in abnormal sample c. Bleeding time estimation in unknown sample	CO4
	Unit 5	a. Clotting estimation in normal sample b. Clotting time estimation in abnormal sample c. Clotting time estimation in unknown sample	CO5
	Mode of examination	Theory and Practical	
	Weightage Distribution for Theory	CA: 30% / MTE: 20% / ETE: 50%	
	Weightage Distribution for Practical's	CA: 60% / MTE: 0% / ETE: 40%	
	Text book/s*	1) Histopathology Techniques by Culling 2) Cytology by Koss 3) Clinical diagnosis by Laboratory method by Todd and Sanford 4) Laboratory Technology by RamnicSood 5) Practical Haematology by Dacie and Lewis 6) Text book of Pathology by Krishna	

BMH 108 -MICROBIOLOGY-I &BMH158 - MICROBIOLOGY-I (Lab)

School: SAHS	**Batch : 2020-23**	

Program: BMLT-Honors		**Current Academic Year: 2020-21**	
Branch: Medical Lab Technology-Honors		**Semester: 1**	
1	Course Code	**BMH 108**	
2	Course Title	**MICROBIOLOGY-I**	
3	Credits	**3**	
4	Contact Hours (L-T-P)	**2-1-0**	
	Course Status	Compulsory	
5	Course Objective	• To introduce basic principles and application relevance of clinical disease for students who are in preparation for lab technologists. • To know many etiological agents responsible for global infectious diseases caused by bacteria, viruses and other pathogens related with infectious diseases in humans. • To provide the conceptual basis for understanding pathogenic microorganisms and particularly address the fundamental mechanisms of their pathogenicity. • To provide opportunities for a student to develop diagnostic skills in microbiology, including the practical application and interpretation of laboratory tests for the diagnosis of infectious diseases	
6	Course Outcomes	CO1: To know about Microbiology and its importance CO2:to know the importance of immunology and immune system	

		CO3:To know the mechanism of Hypersensitivity and vaccines formation CO4:To know the importance of General bacteriology CO5:To know the importance of Systemic bacteriology	
7	Course Description	• Introduction of microbiology • Introduction to immunology and immune system • Hypersensitivity and vaccines • General bacteriology • Systemic bacteriology	
8	Outline syllabus **Theory**		
	Unit 1	**Introduction of microbiology**	
		1) Medical Microbiological terminologies 2) Importance and applications of medical Microbiology 3) History	
	Unit 2		
		Sterilization, antiseptic and disinfection Microscopy Organ and cells involved in immune response Antigen and characteristics Classification and nature of Immunity: Innate and acquired immunity	
	Unit 3		
		1) Innate and acquired immunity 2) Hypersensitivity 3) Immunity (vaccines)	
	Unit 4		

		1) Bacterial taxonomy,General properties: morphology and anatomy 2) Physiology: nutrient & microbial growth 3) Culture media and identification	
	Unit 5		
		1) Introduction, classification, general features, pathogenicity, diagnosis, treatment and prevention of Mycobacterium tuberculosis, Mycobacterium leprae, Enterobacteriaceae: coliform, proteus, Staphylococcus aureus, Steptococcuspneumoniae. 2) Diarrhoea: salmonella, shigella, vibrio 3) Food poisoning: clostridium	
	Course Code	**BMH 158**	
	Course Title	**MICROBIOLOGY –I(LAB)**	
	Credits	**1**	
	Contact Hours (L-T-P)	**0-0-2**	
	Course Outcomes	CO1: To know about Microbiology and its importance CO2:to know the importance ofsterilization CO3:To know the different types of glassware's CO4:To know the importance of equipment's CO5:To know the importance of Gram staining	
	Course Description	• Introduction of microbiology • Identification of glassware's • Identification of equipment's • Staining methods • Sample collection and its processing	
	Practical's		
	Unit 1	a. Safety rules in a microbiology laboratory b. Demonstration of glassware's, plastic wares used in microbiology lab c. Sterilization	CO1

	Unit 2	a. Demonstration of equipment's used in microbiology lab (microscope, hot air oven, autoclave, water bath, electronic weighing balance etc.). b. Sample accountability, c. Calibration of clinical laboratory instruments.	CO2
	Unit 3	a. Result interpretation and reporting's. b. Quality management system and c. Ethics in medical laboratory practice.	C03
	Unit 4	a. Collection of clinical specimens, b. Transportation of sample c. Sample processing	CO4
	Unit 5	a. Staining: methods of smear preparation and fixation, b. Staining of spores and capsules examination c. Gram staining and Zn staining	CO5
	Mode of examination	Theory and Practical	
	Weightage Distribution for Theory	CA: 30% / MTE: 20% / ETE: 50%	
	Weightage Distribution for Practical's	CA: 60% / MTE: 0% / ETE: 40%	
	Text book/s*	1) Medical Microbiology by Anathanarayana and Panikar 2) Medical Microbiology –The practice of medical Microbiology by RobertyCruckshank 3) Parasitology – Interpretation to Clinical Medicine by Chatterjee 4) Medical Mycology by Rippon 5) Medical Parasitology by AjitDamle	

BMH 109 – HUMAN ANATOMY-I&BMH 159 – HUMAN ANATOMY-I (Lab)

School: SAHS	**Batch : 2020-23**	
Program: BMLT-Honors	**Current Academic Year: 2020-21**	

Branch: Medical Lab Technology		**Semester: 1**	
1	Course Code	**BMH 109**	
2	Course Title	**HUMAN ANATOMY-I**	
3	Credits	**3**	
4	Contact Hours (L-T-P)	**2-1-0**	
	Course Status	Compulsory	
5	Course Objective	1) To provide an opportunity for lab technologists who distinguish themselves in Human Anatomy - dissection consistency, theoretical knowledge and knowledge application, to undertake research based training in Anatomy. 2) To capture distinguished medical students and offer them such training as would enable them to sub-specialize in anatomy at an early stage of their career. 3) To develop as research scientists and research based teachers for schools of allied health sciences both locally and externally. 4) It also strengthens the research foundation of the students with broad vision of leading in research based teaching of anatomy and stimulates the research attitudes and aptitudes of students.	
6	Course Outcomes	CO1: To understand the importance of Anatomy of human body CO2: To understand the importance of different types of bones involved in locomotion CO3: To understand the importance of	

		Cardiovascular system CO4: To understand the importance of Gastro-intestinal system CO5: To understand the importance of Respiratory system	
7	Course Description	• Cells and its organelles • Locomotion and support • Cardiovascular system • Gastro-intestinal system • Respiratory system	
8	Outline syllabus **Theory**		CO mapping
	Unit 1	Introduction of Anatomy	
		1. Introduction to Anatomy (division, planes, terminology for direction & movements) 2. Cell and its organelles 3. Tissue: Connective &Epithelium- definition, classification, example and function 4. Glands- classification, describe serous and mucus glands with example. 5. Basic tissue classification with examples.	CO1
	Unit 2	Locomotion and support	CO2
		1. Cartilage – types and histology 2. Bones – classification, development, histology. 3. Joints – classification with examples. 4. Muscles – classification and histology (name of muscles of the body) 5. Details of synovial joint	
	Unit 3	Cardiovascular system	CO3
		1. Heart- size, location, chambers, exterior and interior. 2. Blood supply of heart (Branches of aorta and all major artery, Major veins of body) 3. Systemic and pulmonary circulation 4. Lymphatic system (Histology of lymphatic organs)	
	Unit 4	Gastro intestinal system	CO4

		1. Parts of GIT, oral cavity (lips, tongue, salivary gland with histology), tonsil, dentition, pharynx, salivary gland, waldeyer's ring. 2. Oesophagus. Stomach. Intestine. 3. Radiographs of abdomen. 4. Accessory digestive organs (liver, pancreas, gallbladder)	
	Unit 5	Respiratory system	CO5
		1. Part of respiratory system 2. Nose, nasal cavity, larynx, trachea 3. Lungs and Broncho pulmonary segment 4. Histology of lungs 5. Names of paranasal sinuses.	
1	**Course Code**	**BMH 159**	
2	**Course Title**	**HUMAN ANATOMY –I (LAB)**	
3	**Credits**	**1**	
4	**Contact Hours (L-T-P)**	**0-0-2**	
5	Course Outcomes	CO1: To know about Anatomy and its importance CO2: To know the importance of epithelium, cartilage and bones CO3: To know the importance of skeletal (TS & LS), smooth and cardiac muscle CO4: To know the importance of artery, vein, lymph node, spleen, tonsil and thymus CO5:To know the importance of respiratory system	
6	Course Description	• Histology of types of epithelium, serous, mucus and mixed salivary gland • Histology of cartilages, bones • Histology of skeletal (TS & LS), smooth and cardiac muscle • Histology of artery, vein, lymph node, spleen, tonsil and thymus • Demonstration of parts of respiratory system and histology of lung and trachea	

	Practical's				CO mapping
	Unit 1	a. Histology of epithelium and salivary gland, b. Histology of cartilage, compact and cancellous bone. c. Histology of muscle tissue.			CO1
	Unit 2	a. Demonstration of all bone. b. Radiograph of bones & joints. c. Demonstration of all body muscles.			CO2
	Unit 3	a. Histology of vessels. b. Histology of lymph node, c. Histology of spleen.			CO3
	Unit 4	a. Histology of tonsil and thymus b. Demonstration of heart and related structure c. Radiograph related to heart			CO4
	Unit 5	a. Demonstration of lung b. Demonstration of lung related structure. c. Radiograph related to lungs.			CO5
	Mode of examination	Theory and Practical			
	Weightage Distribution for Theory	CA	MTE	ETE	
		30%	20%	50%	
	Weightage Distribution for Practical's	CA	MTE	ETE	
		60%	0%	40%	
	Text book/s*	1) Understanding Human Anatomy and Physiology by William Davis 2) A text book of Anatomy by BD Chaurasia 3) A text book of human Anatomy by T.S. Ranganathan			

BMH 110 – HUMAN PHYSIOLOGY-I& BMH150 – HUMAN PHYSIOLOGY-I (Lab)

School: SAHS		**Batch : 2020-23**	
Program: BMLT-Honors		**Current Academic Year: 2020-21**	
Branch: Medical Lab Technology-Honors		**Semester: 1**	
1	Course Code	**BMH 110**	
2	Course Title	**Human Physiology-I**	
3	Credits	**3**	
4	Contact Hours (L-T-P)	**2-1-0**	
	Course Status	Compulsory	
5	Course Objective	• To learn and understand the fundamental scientific concepts relating to a broad range of topics in human physiology. • To make the students familiar with the basic factual information concerning the mechanisms and functioning of humans body system. • To develop investigative skills and to become familiar with standard techniques of measurement. • To help the students to gain practice and confidence in applying this knowledge, in a quantitative manner where appropriate, to actual experiments.	
6	Course Outcomes	CO1: To know the importance of general and nerve	

		muscle physiology CO2: To understand the importance, function and function of Blood along with clinical importance CO3:To get the information about Cardiovascular system CO4: To understand the respiratory system and its function CO5:To know about Digestive system of the body	
7	Course Description	• General & nerve muscle physiology • Blood • Cardiovascular system • The respiratory system • Digestive system	
8	Outline syllabus **Theory**		CO mapping
	Unit 1		
		1. Cell and cell organelle Structure &function, transport across cell membrane, homeostasis, membrane potential. 2. Structure & functions of nerve tissues, physiological properties of nerve fibres, nerve fibre types & functions. 3. Neuromuscular junction, Difference between skeletal muscle, smooth muscle & cardiac muscle.	CO1
	Unit 2		
		1. Composition & functions of blood, plasma	CO2

		proteins & haemoglobin. 2. Erythrocytes, jaundice, leucocytes & platelets. 3. Blood coagulation, blood groups & immunity	
	Unit 3		
		1. Cardiac Muscle, physiological anatomy of the heart & blood vessels, cardiac cycle. 2. Conducting system of heart, Heart sounds & ECG. 3. Heart Rate, Cardiac Output, Blood Pressure & Pulse.	CO3
	Unit 4		
		1. Physiological anatomy & functions of respiratory system, airways, dead space, graph of lung volume & capacities. 2. Transport of Gases. 3. Regulation of respiration & Hypoxia.	CO4
	Unit 5		
		1. Physiological anatomy of GIT, Saliva, Mouth & Oesophagus. 2. Stomach, Pancreas, Liver & Gall Bladder. 3. Small Intestine, Large Intestine, Digestion and Absorption in GIT.	CO5

1	**Course Code**	**BMH 150**	
2	**Course Title**	**HUMAN PHYSIOLOGY –I(LAB)**	
3	**Credits**	**1**	
4	**Contact Hours (L-T-P)**	**0-0-2**	
5	Course Outcomes	CO1: To know about Physiology and its importance CO2:To know the importance ofCompound microscope CO3:To know the importance of haemoglobin estimation and blood group detection CO4:To know the importance of Total Red Blood Cell Count and total Leucocyte Count CO5: To know the importance of ESR and PCV	
6	Course Description	• Study of Compound Microscope • Estimation of Haemoglobin Concentration • Total Red Blood Cell Count. • Total Leucocyte Count. • BT,CT,Blood Group Estimation and Demonstration of ESR & PCV.	
	Practical's		CO mapping
	Unit 1	Study of Compound Microscope	CO1
		a. Briefing b. Demonstration c. Practical	
	Unit 2	**Estimation of Haemoglobin Concentration**	CO2
		a. Briefing b. Demonstration	

		c. Practical			
	Unit 3	Total Red Blood Cell Count and			CO3
		a. Briefing b. Demonstration c. Practical			
	Unit 4	Total Leucocyte Count			CO4
		a. Briefing b. Demonstration c. Practical			
	Unit 5	**Bleeding Time,Clotting Time, Blood Group Estimation and Demonstration of ESR & PCV.**			CO5
		a. BT & CT b. Blood Groups c. Demonstration of ESR & PCV			
	Mode of examination	Theory and Practical's			
	Weightage Distribution for Theory	CA	MTE	ETE	
		30%	20%	50%	
	Weightage Distribution for Practical's	CA	MTE	ETE	
		60%	0%	40%	
	Text book/s*	1) Text book of Physiology by Guyton 2) Human Physiology by Chatterjee 3) Concise Medical Physiology by sujith K Choudhary 4) Review of Medical Physiology by Ganong 5) A text book of Physiology by A.K.Jain			

BMH 011: ENGLISH-I

School: SAHS		**Batch : 2020-23**	
Program: BMLT-Honors		**Current Academic Year: 2020-21**	
Branch: Medical Lab Technology-Honors		**Semester: 1**	
1	Course Code	**BMH 011**	
2	Course Title	**ENGLISH-I**	
3	Credits	**2**	
4	Contact Hours (L-T-P)	**2-0-0**	
	Course Status	Pre requisite	
5	Course Objective	To develop the better understanding in English language To develop the English communication skill To know the importance of English in programme To develop the potential of independent learner in the student	
6	Course Outcomes	CO1: To know the use of parts of speech CO2: To know the importance of Articles CO3: To know the use of tenses CO4: To know the implication of vocabulary enhancement CO5: To understand the pattern of reading comprehension	
7	Course Description	1) Basic elements of grammar 2) Vocabulary enhancement 3) Reading comprehension	
8	Outline syllabus **Theory**		
	Unit 1		**CO mapping**
		1. Parts of speech, 2. Articles: A, An , The	CO1

		3.Tenses			
	Unit 2				
		1. Antonyms & Synonyms, 2. Homophones, 3. Homonyms			CO2
	Unit 3				
		1. Reading comprehension 2. Reading comprehension passage, 3. Discussions Based on the text			CO3
	Mode of examination	Jury/Viva			
	Weightage Distribution for Theory	CA	Viva	ETE	
		50%	50%	0%	
	Text book/s*	1) First flight: Text book in English 2) Pearson: Text book in English			

3	3	3	3	3	3
3	3	2	3	3	3
3	3	3	3	3	3
3	3	3	3	3	3
3	3	3	3	2	3

BMH 111: BIOCHEMISTRY- II &BMH 151: BIOCHEMISTRY- II (Lab)

School: SAHS		**Batch : 2020-23**	
Program: BMLT-Honors		**Current Academic Year: 2020-21**	
Branch: Medical Lab Technology-Honors		**Semester: 2**	
1	Course Code	**BMH 111**	
2	Course Title	**BIOCHEMISTRY -II**	
3	Credits	**3**	
4	Contact Hours (L-T-P)	**2-1-0**	
	Course Status	Compulsory	
5	Course Objective	• To train the students in the management of medical laboratory along with handling a variety of laboratory chemicals and instruments including electronic and advanced equipment's used in modern medical laboratories. • To make the students able to do routine laboratory testing under stipulated conditions. • To prepare specimens and operate machines that automatically analyse samples. • To provide the conceptual basis for understanding biochemical and particularly address the fundamental mechanisms of the biomolecules to facilitate the life. • To develop diagnostic skills in clinical biochemistry and to provide an advanced understanding of the core principles and topics of Biochemistry and their experimental basis.	
6	Course Outcomes	CO1: To understand the importance of amino acid chemistry CO2: To understand the importance of Enzymes CO3: To understand the importance of Minerals CO4: To understand the importance of vitamins CO5: To understand the importance of cell biology and chemistry of nucleic acid	

7	Course Description	• Amino-acid Chemistry • Enzymes • Mineral metabolism • Vitamins • Cell Biology, Nucleotide and Nucleic acid Chemistry	
8	Outline syllabus **Theory**		CO mapping
	Unit 1	**Amino-acid Chemistry**	CO1
		1. Amino acid chemistry: Definition, Classification, Peptide bonds. Peptides: Definition, Biologically important peptides. 2. Protein chemistry: Definition, Classification, Functions of proteins, 3. Primary, Secondary, tertiary and quartenary structure of proteins	
	Unit 2	**Enzymes**	CO2
		1. Definition, Active site, Cofactor (Coenzyme, Activator), Proenzyme. Classification with examples, Factors effecting enzyme activity. 2. Enzyme inhibition and significance, 3. Isoenzymes, Diagnostic enzymology (clinical significance of enzymes)	
	Unit 3	**Mineral metabolism**	CO3
		1. Definition, Sources, RDA, absorption, transport, and excretion of various minerals. 2. Functions of various minerals 3. Disorder of various minerals (Sodium, Potassium, Calcium, Phosphate, Sulphur, Iron, Magnesium, Fluoride, Selenium, Zinc and Copper)	
	Unit 4	**Vitamins**	CO4
		1. Definition, classification according to solubility, Sources and Coenzyme forms of different vitamins 2. Functions, RDA, digestion, absorption and	

		transport of various vitamins. 3. Deficiency and toxicity of various vitamins	
	Unit 5	**Cell Biology, Nucleotide and Nucleic acid Chemistry**	CO5
		1. Cell structure, Cell membrane structure and function, various types of absorption. Intracellular organelles and their functions, briefly on cytoskeleton. 2. Nucleotide chemistry: Nucleotide composition,functions of free nucleotides in body. 3. Nucleic acid (DNA and RNA) chemistry: Differencebetween DNA and RNA, Structure of DNA (Watson and Crick model), Functions of DNA. Structure and functions of tRNA, rRNA, mRNA.	
1	**Course Code**	**BMH 151**	
2	**Course Title**	**BIOCHEMISTRY –II(LAB)**	
3	**Credits**	**1**	
4	**Contact Hours (L-T-P)**	**0-0-2**	
5	Course Outcomes	CO1: To understand the importance of different types of acids CO2: To understand the importance of different types of bases CO3: To understand the importance of different types of solutions CO4: To understand the importance of carbohydrates CO5: To understand the importance of proteins	
6	Course Description	• Preparation of acids of different concentration: • Preparation of bases of different concentration: • Preparation of solutions of different concentration: • Qualitative analysis of Carbohydrates • Qualitative analysis of Proteins	

	Practical's				CO mapping
	Unit 1	a. Preparation of acids of different concentration-1 b. Preparation of acids of different concentration-2 c. Preparation of acids of different concentration-3			CO1
	Unit 2	a) Preparation of bases of different concentration-1 b) Preparation of bases of different concentration-2 c) Preparation of bases of different concentration-3			CO2
	Unit 3	a. Preparation of solutions of different concentration-1 b. Preparation of solutions of different concentration-2 c. Preparation of solutionsof different concentration-3			CO3
	Unit 4	a) Qualitative analysis of Carbohydrates-1 b) Qualitative analysis of Carbohydrates-2 c) Qualitative analysis of Carbohydrates-3			CO4
	Unit 5	a) Qualitative analysis of Proteins-1 b) Qualitative analysis of Proteins-2 c) Qualitative analysis of Proteins-3			CO5
	Mode of examination	Theory and Practical			
	Weightage Distribution for Theory	CA	MTE	ETE	
		30%	20%	50%	
	Weightage Distribution for Practical's	CA	MTE	ETE	
		60%	0%	40%	
	Text book/s*	1. A text book of Medical Biochemistry by Chatterjee&Shinde 2. Text book of biochemistry for Medical students by Vasudevan and Sreekumari 3. Biochemistry by Lehringer 4. Clinical chemistry by Varley 5. Harpers Illustrated Biochemistry by Robert K.M.			

BMH 112: PATHOLOGY- II &BMH 152: PATHOLOGY- II (Lab)

School: SAHS		**Batch : 2020-23**	
Program: BMLT-Honors		**Current Academic Year: 2020-21**	
Branch: Medical Lab Technology-Honors		**Semester: 2**	
1	Course Code	**BMH 112**	
2	Course Title	**PATHOLOGY-II**	
3	Credits	**3**	
4	Contact Hours (L-T-P)	**2-1-0**	
	Course Status	Compulsory	
5	Course Objective	• To introduce basic principles and application relevance of clinical disease for students who are in preparation for laboratory technologists. • The content of rigorous course provide knowledge of the structure and function of the major organ systems, including the molecular, biochemical and cellular mechanisms for maintaining homeostasis. • It also provide knowledge of the pathogenesis of diseases, interventions for effective treatment, and mechanisms of health maintenance to prevent disease. • The student will be able to properly order and interpret hematologic and coagulation tests, including CBC's, PT's, INR's, and APTT's, for the proper diagnosis and effective treatment of	

		patients with hematologic, bleeding, and thrombotic disorders.	
6	Course Outcomes	CO1: To understand the importance of Histopathology CO2: To understand the importance of Grossing and mounting techniques CO3: To understand the importance of Clinical pathology CO4: To understand the importance of Urine examination CO5: To understand the importance of examination of body fluids	
7	Course Description	• Introduction to Histopathology • Grossing and mounting techniques • Clinical pathology • Urine collection and examination • Examination of body fluid	
8	Outline syllabus **Theory**		CO mapping
	Unit 1		
		1. Introduction to histopathology 2. Receiving of specimen in the laboratory 3. Grossing techniques	CO1
	Unit 2		
		1. Mounting techniques 2. Maintenance of records and filing of the slides. 3. Use and care of microscopes	CO2
	Unit 3		
		1. Various fixatives, Mode of action, preparation and indication. 2. Introduction to clinical pathology 3. Collection, transport, preservation and processing of various clinical specimens.	CO3
	Unit 4		
		1. Urine examination: Collection and preservation of urine. 2. Physical and chemical examination.	CO4

		3. Microscopic examination of urine.	
	Unit 5		
		1. Examination of cerebrospinal fluid (CSF) 2. Sputum examination 3. Examination of faeces.	CO5
	Course Code	**BMH 152**	
	Course Title	**PATHOLOGY –II (LAB)**	
	Credits	**1**	
	Contact Hours (L-T-P)	**0-0-2**	
	Course Outcomes	CO1: To understand the importance of Urine examination CO2: To understand the importance of abnormal constituents of urine CO3: To understand the importance of section cutting CO4: To understand the importance of Tissue processing CO5: To understand the importance of tissue staining	
	Course Description	• Urine examination • Physical, chemical and microscopic examination. • Section cutting • Tissue processing for routine paraffin sections • Staining of tissues-H & E staining	
	Practical's		CO mapping
	Unit 1	a. Physical examination of Urine b. Chemical examination of Urine c. Normal constituent of urine	CO1
	Unit 2	a. Abnormal constituent of urine b. Microscopic examination of Normal Urine sample c. Microscopic examination of abnormal Urine sample	CO2
	Unit 3	a. Importance of section cutting b. Methods of section cutting	CO3

		c. Precautionary measures in section cutting			
	Unit 4	a. Importance of Tissue processing for routine paraffin sections b. Methods of Tissue processing for routine paraffin sections c. Precautionary measures in Tissue processing for routine paraffin sections			CO4
	Unit 5	a. Importance of staining of tissues b. Methods of staining of tissues (H & E staining) c. Precautionary measures in staining of tissues			CO5
	Mode of examination	Theory and Practical			
	Weightage Distribution for Theory	CA	MTE	ETE	
		30%	20%	50%	
	Weightage Distribution for Practical's	CA	MTE	ETE	
		60%	0%	40%	
	Text book/s*	1. Histopathology Techniques by Culling 2. Cytology by Koss 3. Clinical diagnosis by Laboratory method by Todd and Sanford 4. Laboratory Technology by RamnicSood 5. Practical Haematology by Dacie and Lewis 6. Text book of Pathology by Krishna			

Program: BMLT-Honors		**Current Academic Year: 2020-21**	
Branch: Medical Lab Technology-Honors		**Semester: 2**	
1	Course Code	**BMH 113**	
2	Course Title	**MICROBIOLOGY-II**	
3	Credits	**3**	
4	Contact Hours (L-T-P)	**2-1-0**	
	Course Status	Compulsory	
5	Course Objective	• To introduce basic principles and application relevance of clinical disease for students who are in preparation for lab technologists. • To know many etiological agents responsible for global infectious diseases caused by bacteria, viruses and other pathogens related with infectious diseases in humans. • To provide the conceptual basis for understanding pathogenic microorganisms and particularly address the fundamental mechanisms of their pathogenicity. • To provide opportunities for a student to develop diagnostic skills in microbiology, including the practical application and interpretation of laboratory tests for the diagnosis of infectious diseases	
6	Course Outcomes	CO1: To know the importance of Parasitology CO2:To know the importance ofVirology CO3:To know the importance of Mycology CO4:To know the mechanism of hospital	

		acquired infection CO5:To know the importance of Biomedical waste management	
7	Course Description	• Introduction of Parasitology • Introduction of Virology • Introduction of Mycology • Pathogenesis, diagnosis and treatment of parasites, viral and fungal diseases • Biomedical waste management	
8	Outline syllabus **Theory**		CO mapping
	Unit 1		
		a. Parasitology: Introduction and classification. b. General features of parasites c. Pathogenicity, diagnosis, treatment and prevention of parasites, Plasmodium, Amoebiasis, Roundworm, Hookworm, Giardiasis	CO1
	Unit 2		
		a. Virology: Introduction, classification, general features, pathogenicity, diagnosis, treatment and prevention. b. Taxonomy and general features of viruses c. Cultivation of virus, Orthomyxovirus, Paramyxovirus, Hepatitis, Herpesvirus, HIV	CO2
	Unit 3		
		a. Mycology: Introduction and classification b. General features of fungus c. Pathogenicity, diagnosis, treatment and prevention of fungal diseases.	CO3
	Unit 4		
		a. Taxonomy and general features of fungus b. Lab Diagnosis of fungal disease c. Subcutaneous Mycoses	CO4
	Unit 5		

		a. Systemic Mycoses b. Hospital acquired infection c. Biomedical waste management	CO5
	Course Code	**BMH 153**	
	Course Title	**MICROBIOLOGY –II (LAB)**	
	Credits	**1**	
	Contact Hours (L-T-P)	**0-0-2**	
	Course Outcomes	CO1: To know about importance of permanent slides CO2:To know the importance ofculture media and its preparation CO3:To know the different types of culture conformation tests CO4:To know the importance of biochemical tests CO5:To know the importance of Enzyme production tests	
	Course Description	• Demonstration of permanent slides • Bacterial culture media and culture methods • Preparation of culture media • Bacterial growth on culture media and Isolation of pure cultures • Culture conformation tests • Biochemical tests • Enzyme production tests	
	Practical's		CO mapping
	Unit 1	a. Demonstration of permanent slide of Ascaris b. Demonstration of permanent slide of Hookworm c. Bacterial culture media and culture method	CO1
	Unit 2	a. Preparation of culture media (nutrient broth and nutrient agar) b. Preparation of culture media (blood agar	CO2

		and chocolate agar) c. Preparation of culture media (MacConkey medium, LJ medium and Robertson Cooked meat media)	
	Unit 3	a. Bacterial growth on culture media b. Isolation of pure cultures c. Culture conformation (colony morphology and microscopy)	CO3
	Unit 4	a. Culture conformation (biochemical test) b. Culture conformation (Antibiotic Sensitivity Test) c. Biochemical tests - Carbohydrate Utilization test.	CO4
	Unit 5	a. Enzyme production tests (catalase and urease) b. Enzyme production tests (oxidase and coagulase) c. Other tests (indole, citrate, nitrate, triple sugar, iron)	CO5
	Mode of examination	Theory and Practical	
	Weightage Distribution for Theory	CA: 30% / MTE: 20% / ETE: 50%	
	Weightage Distribution for Practical's	CA: 60% / MTE: 0% / ETE: 40%	
	Text book/s*	1. Medical Microbiology by Anathanarayana and Panikar 2. Medical Microbiology –The practice of medical Microbiology by RobertyCruckshank 3. Parasitology – Interpretation to Clinical Medicine by Chatterjee 4. Medical Mycology by Rippon	

BMH 114 – HUMAN ANATOMY-II &BMH 154 – HUMAN ANATOMY-II (LAB)

School: SAHS	**Batch : 2020-23**	
Program: BMLT-	**Current Academic Year: 2020-21**	

Honors			
Branch: Medical Lab Technology-Honors		**Semester: 2**	
1	Course Code	**BMH 114**	
2	Course Title	**HUMAN ANATOMY-II**	
3	Credits	**3**	
4	Contact Hours (L-T-P)	**2-1-0**	
	Course Status	Compulsory	
	Course Objective	5) To provide an opportunity for lab technologists who distinguish themselves in Human Anatomy - dissection consistency, theoretical knowledge and knowledge application, to undertake research based training in Anatomy. 6) To capture distinguished medical students and offer them such training as would enable them to sub-specialize in anatomy at an early stage of their career. 7) To develop as research scientists and research based teachers for schools of allied health sciences both locally and externally. 8) It also strengthens the research foundation of the students with broad vision of leading in research based teaching of anatomy and stimulates the research attitudes and aptitudes of students.	
6	Course Outcomes	CO1: To understand the anatomy of Urinary system CO2: To understand the importance of Reproductive system CO3: To understand the position and function of	

		Endocrine glands CO4: To understand the importance of parts of Nervous system CO5: To understand the importance and location of sensory organs	
7	Course Description	• Urinary system • Reproductive system • Endocrine glands • Nervous system • Sensory organs	
8	Outline syllabus **Theory**		CO mapping
	Unit 1	**Urinary system**	CO1
		1. Description in brief Urinary system 2. Kidney, ureter, urinary bladder, male and female urethra 3. Histology of kidney, ureter and urinary bladder	
	Unit 2	**Reproductive system**	CO2
		1. Parts of male reproductive system, testis, vasdeferens and epididymis (gross and histology) 2. Parts of female reproductive system, ovary (gross and histology), fallopian tube, uterus and mammary gland gross. 3. Embryology: gametogenesis, ovulation, fertilization. 4. Prostate gland, Mammary gland, Fetal circulation, Placenta.	
	Unit 3	**Endocrine glands**	CO3
		1. Name of all endocrine glands in detail 2. Pituitary gland and thyroid gland in detail 3. Parathyroid gland, suprarenal gland (gross and histology)	
	Unit 4	**Nervous system**	CO4

		1. Neuron, Classification of Nervous system,Cerebrum, cerebellum, midbrain, pons, medulla oblongata. 2. Spinal cord with spinal nerve,Meninges, Ventricles and cerebrospinal fluid 3. Names of basal nuclei, Blood supply of brain, Cranial nerves, Sympathetic trunk and parasympathetic ganglia	
	Unit 5	**Sensory organ**	CO5
		1. Skin: Skin histology, Appendages of skin 2. Eye: parts of eye, extra ocular muscle and blood supply 3. Ear: parts of external, middle and internal ear with contents.	
1	**Course Code**	**BMH 154**	
2	**Course Title**	**HUMAN ANATOMY –II (LAB)**	
3	**Credits**	**1**	
4	**Contact Hours (L-T-P)**	**0-0-2**	
5	Course Outcomes	CO1: To know about the importance of urinary system CO2: To know the location and importance of glands CO3: To know the importance and role of different types of nerves CO4: To know the importance and parts of Brain CO5:To know the importance and location of Sensory organs	
6	Course Description	• Reflections and urinary system • Different types of endocrine glands • Different types of nerves • Brain and its part along with function • Sensory organs such as skin and eye	
	Practical's		CO mapping

	Unit 1	a. Demonstration of parts of urinary system b. Histology of kidney, ureter and urinary bladder c. Radiograph related to urinary system	CO1
	Unit 2	a. Demonstration of reproductive organ b. Radiograph related to reproductive system	CO2
	Unit 3	a. Demonstration of eyeball b. Histology of eyeball	CO3
	Unit 4	a. Demonstration of glands b. Histology of pituitary gland and thyroid gland. c. Histology of parathyroid and suprarenal gland.	CO4
	Unit 5	a. Histology of thick skin b. Histology of thin skin c. Demonstration of brain and spinal cord	CO5
	Mode of examination	Theory and Practical	
	Weightage Distribution for Theory	CA: 30% / MTE: 20% / ETE: 50%	
	Weightage Distribution for Practical's	CA: 60% / MTE: 0% / ETE: 40%	
	Text book/s*	1. Understanding Human Anatomy and Physiology by William Davis 2. A text book of Anatomy by BD Chaurasia 3. Human anatomy by Fattana 4. Physiology and Anatomy with practical considerations by Ester. M.Grishcimer	

School: SAHS		**Batch : 2020-23**	
Program: BMLT-Honors		**Current Academic Year: 2020-21**	
Branch: Medical Lab Technology-Honors		**Semester: 2**	
1	Course Code	**BMH 115**	
2	Course Title	**HUMAN PHYSIOLOGY-II**	
3	Credits	**3**	
4	Contact Hours (L-T-P)	**2-1-0**	
	Course Status	Compulsory	
5	Course Objective	• To learn and understand the fundamental scientific concepts relating to a broad range of topics in human physiology. • To make the students familiar with the basic factual information concerning the mechanisms and functioning of humans body system. • To develop investigative skills and to become familiar with standard techniques of measurement. • To help the students to gain practice and confidence in applying this knowledge, in a quantitative manner where appropriate, to actual experiments.	
6	Course Outcomes	CO1: To understand the importance, function and function of Excretory system of body	

		CO2:To get the information about Endocrine system CO3: To understand the Nervous system and its function CO4: To understand the reproductive system and its function CO5:To know about special senses of the body	
7	Course Description	• Physiology of Excretion system • Endocrine system • Nervous system • Reproductive system • Special Senses	
8	Outline syllabus **Theory**		CO mapping
	Unit 1	**Excretory system**	CO1
		1. Physiological anatomy of kidney, structure and functions of excretory system, structure of nephron. 2. Mechanism of formation of Urine. & mechanism of concentration and dilution of urine. 3. The Counter Current System: Physiology of micturition and Regulation of Body Temperature in Humans.	
	Unit 2	**Endocrine system**	CO2
		1. General principles of endocrinology, The pituitary Gland.	

		2. The Thyroid Gland, The parathyroid, Calcitonin and Vitamin D. 3. The Adrenal Cortex & Pancreas.	
	Unit 3	**Reproductive system**	CO3
		1. Changes during Puberty, Classification of Male sex hormones and their functions, Spermatogenesis & semen. 2. Changes during Puberty, Classification and Functions of female sex hormones, menstruation, ovulation and contraception. 3. Physiological changes during pregnancy, functions of placenta and physiology of lactation.	
	Unit 4	**Nervous system**	CO4
		1. Organisation of Nervous system, The Synapse , Physiology of receptor organs for special and general sensation, physiology of reflex action, classification and properties of reflexes. 2. Intro to Sensory and motor system. Functions of hypothalamus, thalamus, basal ganglia, cerebrum &cerebellum. 3. Autonomic nervous system, Cerebrospinal Fluid and Blood Brain Barrier.	

	Unit 5	**Special Senses**	CO5
		1. Taste and Olfaction. 2. Vision—structure and function of eye, errors of refraction & their correction. Colour blindness. 3. Hearing—structure and function of ear, general outline of mechanism of hearing and perception of sound.	
1	**Course Code**	**BMH 155**	
2	**Course Title**	**HUMAN PHYSIOLOGY –II (LAB)**	
3	**Credits**	**1**	
4	**Contact Hours (L-T-P)**	**0-0-2**	
5	Course Outcomes	CO1: To know about importance of DLC estimation CO2:To know the importance ofTLC estimation CO3:To know the importance of arterial blood pressure measurement CO4:To know the importance of Radial pulse measurement CO5:To know the importance of Blood indices measurement	
6	Course Description	• Differential Leucocyte Count. • Arterial Blood Pressure • Radial pulse. • Blood indices • Effect of posture on blood pressure	
	Practical's		CO mapping
	Unit 1	**Differential Leucocyte Count -1**	CO1
		a. Briefing b. Demonstration	

		c. Practical –Preparation of Blood Smear			
	Unit 2	**Differential Leucocyte Count -2**			CO2
		a. Staining of smear b. Fixation of smear c. Identification of cells			
	Unit 3	**Arterial Blood Pressure measurement**			CO3
		a. Briefing b. Demonstration c. Practical			
	Unit 4	**Radial Pulse measurement**			CO4
		a. Briefing b. Demonstration c. Practical			
	Unit 5	**Effect of posture on Blood pressure**			CO5
		a. Briefing b. Demonstration c. Practical			
	Mode of examination	Theory and Practical's			
	Weightage Distribution for Theory	CA	MTE	ETE	
		30%	20%	50%	
	Weightage Distribution for Practical's	CA	MTE	ETE	
		60%	0%	40%	
	Text book/s*	1. Text book of Physiology by Guyton 2. Human Physiology by Chatterjee 3. Concise Medical Physiology by sujith K Choudhary 4. Review of Medical Physiology by Ganong 5. A text book of Physiology by A.K.Jain			

BMH 206: BIOCHEMISTRY- III &BMH 251: BIOCHEMISTRY- III (Lab)

School: SAHS		**Batch : 2020-23**	
Program: BMLT-Honors		**Current Academic Year: 2021-22**	
Branch: Medical Lab Technology-Honors		**Semester: 3**	
1	Course Code	**BMH 206**	
2	Course Title	**BIOCHEMISTRY -III**	
3	Credits	**4**	
4	Contact Hours (L-T-P)	**2-2-0**	
	Course Status	Compulsory	
5	Course Objective	• To train the students in the management of medical laboratory along with handling a variety of laboratory chemicals and instruments including electronic and advanced equipment's used in modern medical laboratories. • To make the students able to do routine laboratory testing under stipulated conditions. • To prepare specimens and operate machines that automatically analyse samples. • To provide the conceptual basis for understanding biochemical and particularly address the fundamental mechanisms of the biomolecules to facilitate the life. • To develop diagnostic skills in clinical biochemistry and to provide an advanced understanding of the core principles and topics of Biochemistry and their experimental basis.	
6	Course Outcomes	CO1: To understand the diagnostic importance of Blood and Urine CO2: To understand the diagnostic importance of Enzymes CO3: To understand the Chemistry and metabolic pathways of Carbohydrates CO4: To understand the importance of Hormones CO5: To understand the process of formation of ATP and its transport	

7	Course Description	• Blood and Urine chemistry • Clinical Enzymology and Hormones • Nutrition and Carbohydrates chemistry • Carbohydrate digestion, absorption and metabolism • Biological oxidation	
8	Outline syllabus **Theory**		CO mapping
	Unit 1	**Blood and Urine chemistry**	
		4. Physical chemical properties of Blood 5. Physical chemical properties of Urine 6. Diagnostic importance /Clinical significance of Blood and Urine	CO1
	Unit 2	**Clinical Enzymology and Hormones**	
		4. Classification with examples, Factors effecting enzyme activity, Enzyme inhibition and significance, Isoenzymes, Diagnostic importance of enzymes (clinical significance of enzymes) 5. Mechanism of action of pep tidal hormones 6. Mechanism of action of steroidal hormones	CO2
	Unit 3	**Nutrition and Carbohydrate chemistry**	
		a. Importance of nutrition: Calorific values, Respiratory quotient, Energy requirement of a person - Basal metabolic rate. Balanced diet, recommended dietary allowances, Role of carbohydrates, lipid and protein in diet. b. Definition, general classification with examples. Glycosidic bond, Structures, composition, sources, properties and functions of Monosaccharide's and Disaccharides. c. Structures, composition, sources, properties and functions of Oligosaccharides and Polysaccharides.	CO3
	Unit 4	**Carbohydrate digestion, absorption & metabolism**	
		a. Digestion and absorption of different types of Carbohydrates b. Catabolism of Carbohydrates (Glycolysis, Kreb cycle, HMP shunt, glycogenolysis)	CO4

		c. Anabolism of Carbohydrates (Gluconeogenesis, Glycogenesis)	
	Unit 5	**Biological oxidation**	
		d. Electron transport chain e. Oxidative Phosphorylation f. Uncouplers and Shuttle system	CO5
1	**Course Code**	**BMH251**	
2	**Course Title**	**BIOCHEMISTRY –III(LAB)**	
3	**Credits**	**1**	
4	**Contact Hours (L-T-P)**	**0-0-2**	
5	Course Outcomes	CO1: To understand the importance of different types of buffers CO2: To understand the importance of different types of reagents CO3: To understand the importance of qualitative analysis of carbohydrates CO4: To understand the importance of hydrolysis of sucrose and starch CO5: To understand the importance of qualitative analysis of proteins	
6	Course Description	• Preparation of buffer & checking of ph • Preparation of reagent • Qualitative analysis of carbohydrate • Hydrolysis of sucrose & starch • Qualitative analysis of protein	
	Practical's		CO mapping
	Unit 1	a. Preparation of Citrate buffer of different pH b. Preparation of Phosphate buffer of different pH c. Preparation of Carbonate buffer of different pH	CO1
	Unit 2	a. Preparation of reagents of different concentration-1	CO2

<table>
<tr><td></td><td></td><td colspan="3">b. Preparation of reagents of different concentration-2
c. Preparation of reagents of different concentration-3</td><td></td></tr>
<tr><td></td><td>Unit 3</td><td colspan="3">a. Qualitative analysis of Carbohydrates-1
b. Qualitative analysis of Carbohydrates-2
c. Qualitative analysis of Carbohydrates-3</td><td>CO3</td></tr>
<tr><td></td><td>Unit 4</td><td colspan="3">a. Hydrolysis of sucrose
b. Hydrolysis of starch
c. Confirmation of hydrolysis</td><td>CO4</td></tr>
<tr><td></td><td>Unit 5</td><td colspan="3">a. Qualitative analysis of Proteins-1
b. Qualitative analysis of Proteins-2
c. Qualitative analysis of Proteins-3</td><td>CO5</td></tr>
<tr><td></td><td>Mode of examination</td><td colspan="3">Theory and Practical</td><td></td></tr>
<tr><td rowspan="2"></td><td rowspan="2">Weightage Distribution for Theory</td><td>CA</td><td>MTE</td><td>ETE</td><td></td></tr>
<tr><td>30%</td><td>20%</td><td>50%</td><td></td></tr>
<tr><td rowspan="2"></td><td rowspan="2">Weightage Distribution for Practical’s</td><td>CA</td><td>MTE</td><td>ETE</td><td></td></tr>
<tr><td>60%</td><td>0%</td><td>40%</td><td></td></tr>
<tr><td></td><td>Text book/s*</td><td colspan="3">1. A text book of Medical Biochemistry by Chatterjee&Shinde
2. Text book of biochemistry for Medical students by Vasudevan and Sreekumari
3. Biochemistry by Lehringer
4. Clinical chemistry by Varley
5. Harpers Illustrated Biochemistryby Robert K.M.</td><td></td></tr>
</table>

BMH207: PATHOLOGY- III &BMH 252: PATHOLOGY- III (Lab)

School: SAHS		**Batch : 2020-23**	
Program: BMLT-Honors		**Current Academic Year: 2021-22**	
Branch: Medical Lab Technology-Honors		**Semester: 3**	
1	Course Code	**BMH 207**	
2	Course Title	**PATHOLOGY-III**	
3	Credits	**4**	
4	Contact Hours (L-T-P)	**2-2-0**	
	Course Status	Compulsory	
5	Course Objective	• To introduce basic principles and application relevance of clinical disease for students who are in preparation for laboratory technologists. • The content of rigorous course provide knowledge of the structure and function of the major organ systems, including the molecular, biochemical and cellular mechanisms for maintaining homeostasis. • It also provides knowledge of the pathogenesis of diseases, interventions for effective treatment, and mechanisms of health maintenance to prevent disease. • The student will be able to properly order and interpret hematologic and coagulation tests, including CBC's, PT's, INR's, and aPTT's, for the proper diagnosis and effective treatment of	

		patients with hematologic, bleeding, and thrombotic disorders.	
6	Course Outcomes	CO1: To understand the importance of Haematology CO2: To understand the importance of Special haematological tests CO3: To understand the importance of Haemostasis and coagulation CO4: To understand the importance of types of Anaemia CO5: To understand the importance of Bone marrow biopsy study	
7	Course Description	• Haematology • Special haematological tests • Haemostasis and coagulation • Anaemia • Bone marrow biopsy study	
8	Outline syllabus **Theory**		CO mapping
	Unit 1	**Haematology**	
		a) Hemopoiesis, stem cells, formed elements and their functions. b) Anticoagulants used in various haematological studies. c) Routine haematological tests and normal values: 1. Determination of haemoglobin and haematocrit 2. Enumeration of RBC, WBC & platelets	CO1

		3. Absolute Eosinophil count 4. Reticulocyte count 5. Calculation of red cell indices 6. Preparation of staining of blood film for morphology of red cells and differential count	
	Unit 2	**Special haematological tests:**	
		a) Sickling tests and Osmotic fragility test, Determination HBF and HBA2, Haemoglobin electrophoresis, Investigation of G6PD deficiency. b) Plasma haptoglobin and demonstration of hemosiderin in urine. c) Tests for autoimmune haemolyticanaemia, Measurement of abnormal Hb pigments	CO2
	Unit 3	**Haemostasis and coagulation**	
		a) Normal haemostasis, mechanism of blood coagulation and normal fibrinolytic system. Collection of blood and anticoagulants used in coagulation studies. b) Investigation of haemostatic mechanism-BT, CT, whole blood coagulation time test, PT., Assay of clotting factors. c) Tests for fibrinolytic activity- Euglobulin , clot	CO3

		lysis test and platelet function tests.	
	Unit 4	**Anaemia**	
		a) Investigation of megaloblasticanaemia and iron deficiency anaemia b) B12 and folate assay and Schilling test c) Estimation of serum iron and iron binding capacity	CO4
	Unit 5	**Bone marrow biopsy study**	
		a. Needle aspiration and surgical biopsy technique b. Preparation of smears and staining. Demonstration of LE cells, Cytochemistry. c. Administration in haematology and quality control	CO5
	Course Code	**BMH 252**	
	Course Title	**PATHOLOGY –III (LAB)**	
	Credits	**1**	
	Contact Hours (L-T-P)	**0-0-2**	
	Course Outcomes	CO1: To understand the importance of haemoglobin estimation CO2: To understand the importance of hemocrit determination CO3: To understand the importance of Red blood cell count CO4: To understand the importance of Total white	

		blood cell count CO5: To understand the importance of ESR	
	Course Description	• Haemoglobin estimation • Determination of Haematocrit • Red blood cell count • Total white blood cell count • Erythrocyte sedimentation rate	
	Practical's		CO mapping
	Unit 1	Haemoglobin estimation	CO1
		a) Briefing b) Demonstration c) Practical	
	Unit 2	Determination of Haematocrit	CO2
		a) Briefing b) Demonstration c) Practical	
	Unit 3	Red blood cell count	CO3
		a) Briefing b) Demonstration c) Practical	
	Unit 4	Total white blood cell count	CO4
		a) Briefing b) Demonstration c) Practical	
	Unit 5	Erythrocyte sedimentation rate	CO5

		a) Briefing b) Demonstration c) Practical			
	Mode of examination	Theory and Practical			
	Weightage Distribution for Theory	CA	MTE	ETE	
		30%	20%	50%	
	Weightage Distribution for Practical's	CA	MTE	ETE	
		60%	0%	40%	
	Text book/s*	7) Histopathology Techniques by Culling 8) Cytology by Koss 9) Clinical diagnosis by Laboratory method by Todd and Sanford 10) Laboratory Technology by RamnicSood 11) Practical Haematology by Dacie and Lewis 12) Text book of Pathology by Krishna			

BMH 208- MICROBIOLOGY-III & BMH 253- MICROBIOLOGY-III (LAB)

School: SAHS		**Batch : 2020-23**	
Program: BMLT-Honors		**Current Academic Year: 2021-22**	
Branch: Medical Lab Technology-Honors		**Semester: 3**	
1	Course Code	**BMH 208**	
2	Course Title	**MICROBIOLOGY-III**	
3	Credits	**4**	
4	Contact Hours (L-T-P)	**2-2-0**	
	Course Status	Compulsory	
5	Course Objective	• To introduce basic principles and application relevance of clinical disease for students who are in preparation for lab technologists. • To know many etiological agents responsible for global infectious diseases caused by bacteria, viruses and other pathogens related with infectious diseases in humans. • To provide the conceptual basis for understanding pathogenic microorganisms and particularly address the fundamental mechanisms of their pathogenicity. • To provide opportunities for a student to develop diagnostic skills in microbiology, including the practical application and interpretation of laboratory tests for the diagnosis of infectious	

		diseases	
6	Course Outcomes	CO1: To know the importance of Systemic mycoses CO2:To know the importance of Opportunistic mycoses CO3:To know the importance of Infection CO4:To know the mechanism of Immunology CO5:To know the importance of Quality control and biosafety	
7	Course Description	• Systemic mycoses • Opportunistic mycoses • Infection • Immunology • Quality control and biosafety	
8	Outline syllabus **Theory**		CO mapping
	Unit 1	**Superficial mycoses**	
		a. Introduction and classification, b. General features and pathogenicity c. Diagnosis, treatment and prevention	CO1
	Unit 2	**Opportunistic mycoses**	
		a. Introduction and classification, b. General features and pathogenicity c. Diagnosis, treatment and prevention	CO2
	Unit 3	**Infection**	
		a. Urinary tract infection b. Respiratory tract infection c. Genital tract infections, pyrexia of unknown origin, Meningitis	CO3
	Unit 4	**Immunology**	
		a. Immune response: humoral and cell mediated immunity b. Autoimmune disorders c. Transplantation	CO4

	Unit 5	**Quality control and biosafety**	
		1. Principles of laboratory management and 2. Planning Ethical principles, lab organization and management 3. Recording of results and quality control	CO5
	Course Code	**BMH 253**	
	Course Title	**MICROBIOLOGY –III (LAB)**	
	Credits	**1**	
	Contact Hours (L-T-P)	**0-0-2**	
	Course Outcomes	CO1: To know about importance of culture conformation CO2:To know the importance ofSerological tests CO3:To know the importance of Widal and VDRL tests CO4:To know the importance of RA and ASO tests CO5:To know the importance of C reactive protein (CRP) test	
	Course Description	• Culture conformation • Serological test • Widal and VDRL test • Rheumatoid factor (RA) and Anti-streptolysin O (ASO) test • C reactive protein (CRP) test	
	Practical's		CO mapping
	Unit 1	Culture conformation (colony morphology, microscopy, biochemical test and antibiotic sensitivity test)Hanging drop	CO1

		a) Briefing b) Demonstration c) Practical	
	Unit 2	Serological test (precipitation, agglutination, complement fixation, opsonisation, ELISA)	CO2
		a) Briefing b) Demonstration c) Practical	
	Unit 3	Widal andVDRL test	CO3
		a) Briefing b) Demonstration c) Practical	
	Unit 4	Rheumatoid factor (RA) and Anti-streptolysin O (ASO) test	CO4
		a) Briefing b) Demonstration c) Practical	
	Unit 5	C reactive protein (CRP) test	CO5
		a) Briefing b) Demonstration c) Practical	
	Mode of examination	Theory and Practical	
	Weightage Distribution for Theory	CA: 30% / MTE: 20% / ETE: 50%	
	Weightage Distribution for Practical's	CA: 60% / MTE: 0% / ETE: 40%	
	Text book/s*	1. Medical Microbiology by Anathanarayana and Panikar 2. Medical Microbiology –The practice of medical Microbiology by RobertyCruckshank 3. Parasitology – Interpretation to Clinical Medicine by Chatterjee 4. Medical Mycology by Rippon	

BMH 022: ENGLISH-II

School: SAHS		**Batch:2020-23**	
Program: BMLT-Honors		**Current Academic Year: 2021-22**	
Branch: Medical Lab Technology-Honors		**Semester: 3**	
1	Course Code	**BMH 022**	
2	Course Title	**ENGLISH-II**	
3	Credits	**2**	
4	Contact Hours (L-T-P)	**2-1-0**	
	Course Status	Pre requisite	
5	Course Objective	To develop the better understanding in English language To develop the English communication skill To know the importance of English in programme To develop the potential of independent learner in the student	
6	Course Outcomes	CO1: To know the use of parts of speech CO2: To know the importance of Articles CO3: To know the use of tenses CO4: To know the implication of vocabulary enhancement CO5: To understand the pattern of reading comprehension	
7	Course Description	1) Basic elements of grammar 2) Vocabulary enhancement 3) Reading comprehension	
8	Outline syllabus **Theory**		
	Unit 1	**Basic elements of grammar**	**CO mapping**
		1. Subject verb agreement **2.** Active voice	CO1

		3. Passive voice	
	Unit 2	**Vocabulary enhancement**	
		1. One word substitutes Phrasal verbs 2. Formation of words using suffixes 3. Formation of words using prefixes	CO2
	Unit 3	**Reading comprehension**	
		1) The Last Leaf by O Henry: Reading text and discussions**.** 2) Comprehension based exercise 3) Vocabulary based exercise	CO3
	Unit 4	Writing composition and Public speaking skills	
		1) Paragraph writing 2) Summary writing 3) Presentation	CO4
	Mode of examination	Jury/Viva	
	Weightage Distribution for Theory	CA / Viva / ETE 50% / 50% / 0%	
	Text book/s*	1. First flight: Text book in English 2. Pearson: Text book in English	

CO1	3	3	3	3	3	3
CO2	3	3	2	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	2	3

BMH 209: BIOCHEMISTRY- IV&BMH 254: BIOCHEMISTRY- IV (Lab)

School: SAHS		**Batch : 2020-23**	
Program: BMLT-Honors		**Current Academic Year: 2021-22**	
Branch: Medical Lab Technology-Honors		**Semester: 4**	
1	Course Code	**BMH 209**	
2	Course Title	**BIOCHEMISTRY -IV**	
3	Credits	**4**	
4	Contact Hours (L-T-P)	**2-2-0**	
	Course Status	Compulsory	
5	Course Objective	• To train the students in the management of medical laboratory along with handling a variety of laboratory chemicals and instruments including electronic and advanced equipment's used in modern medical laboratories. • To make the students able to do routine laboratory testing under stipulated conditions. • To prepare specimens and operate machines that automaticallyanalyse samples. • To provide the conceptual basis for understanding biochemical and particularly address the fundamental mechanisms of the biomolecules to facilitate the life. • To develop diagnostic skills in clinical biochemistry and to provide an advanced understanding of the core principles and topics of Biochemistry and their experimental basis.	
6	Course Outcomes	CO1: To understand the importance of lipid chemistry and its metabolism CO2: To understand the importance of Haemoglobin, myoglobin and heme metabolism CO3: To understand the importance of Nucleic acid metabolism CO4: To understand the importance of vitamins and	

		minerals CO5: To understand the formation, role and scavenging of free radicals in the body	
7	Course Description	• Lipid chemistry, digestion, absorption and metabolism • Haemoglobin, Myoglobin and porphyria's • Nucleic acid Chemistry and metabolism • Vitamins and minerals metabolism • Free radical chemistry	
8	Outline syllabus **Theory**		CO mapping
	Unit 1	**Lipid chemistry, digestion, absorption and metabolism**	CO1
		1. Definition, classification, properties and functions of Fatty acids,Triacylglycerol, Phospholipids, Cholesterol, Essential fatty acids and their importance, Lipoprotein. 2. Digestion and absorption of lipids 3. Lipid metabolism (Beta oxidation, fatty acid biosynthesis) ketone body's metabolism, Alcohol metabolism.	
	Unit 2	**Haemoglobin, Myoglobin and Porphyria's**	CO2
		1. Definition, structure, types and function of Haemoglobin 2. Definition, structure and function of Myoglobin 3. Heme synthesis, breakdown and diseases associated with heme metabolism	
	Unit 3	**Nucleic acid chemistry and metabolism**	CO3
		1. Nucleotide chemistry: Nucleotide composition, functions of free nucleotides in body. 2. Nucleic acid (DNA and RNA) chemistry: Difference between DNA and RNA, Structure of DNA (Watson and Crick model), Functions of DNA. Structure and functions of tRNA, rRNA, mRNA. 3. Purine and Pyrimidine synthesis and breakdown, Uric acid and gout.	
	Unit 4	**Vitamins and Mineral metabolism**	CO4

		1. Definition, classification according to solubility, Sources and Coenzyme forms of different vitamins, Functions, RDA, digestion, absorption and transport of various vitamins 2. Definition, Sources, RDA, absorption, transport, and excretion of various minerals. Functions of various minerals 3. Deficiency disorders of various minerals (Sodium, Potassium, Calcium, Phosphate, Sulphur, Iron, Magnesium, Fluoride, Selenium, Zinc and Copper) and vitamins (Fat and water soluble vitamins).	
	Unit 5	**Free radicals chemistry**	CO5
		1. Definitions and types of free radicals 2. Mechanism of synthesis and sources of free radicals 3. Harmful effect of free radicals and its scavenging by antioxidant defence system	
1	**Course Code**	**BMH254**	
2	**Course Title**	**BIOCHEMISTRY –IV (LAB)**	
3	**Credits**	**1**	
4	**Contact Hours (L-T-P)**	**0-0-2**	
5	Course Outcomes	CO1: To understand the importance of analysis of fat CO2: To understand the importance of different types of precipitation reactions CO3: To understand the principle of Lambert Beers law CO4: To understand the importance of colorimetry in biochemical analysis CO5: To understand the process of quantitative estimation of glucose and total protein	

6	Course Description	• Qualitative analysis of fat • Precipitation reaction of protein • Verification of Lambert beer law • Colorimetry • Total protein and glucose estimation.	
	Practical's		CO mapping
	Unit 1	a. Qualitative analysis of fat-1 b. Qualitative analysis of fat-2 c. Qualitative analysis of fat-3	CO1
	Unit 2	a. Precipitation reaction of protein-1 b. Precipitation reaction of protein-2 c. Precipitation reaction of protein-3	CO2
	Unit 3	a. Verification of Lambert law b. Verification of Beer's law c. Importance of standard, Test and Blank solution in Colorimeter	CO3
	Unit 4	a. Quantitative analysis of Glucose in normal sample b. Quantitative analysis of Glucose in abnormal sample c. Quantitative analysis of Glucose in unknown sample	CO4
	Unit 5	a. Quantitative analysis of Total protein in normal sample b. Quantitative analysis of Total Protein in	CO5

		abnormal sample c. Quantitative analysis of Total Protein in unknown sample			
	Mode of examination	Theory and Practical			
	Weightage Distribution for Theory	CA	MTE	ETE	
		30%	20%	50%	
	Weightage Distribution for Practical's	CA	MTE	ETE	
		60%	0%	40%	
	Text book/s*	1. A text book of Medical Biochemistry by Chatterjee&Shinde 2. Text book of biochemistry for Medical students by Vasudevan and Sreekumari 3. Biochemistry by Lehringer 4. Clinical chemistry by Varley 5. Harpers Illustrated Biochemistryby Robert K.M.			

School: SAHS		**Batch : 2020-23**	
Program: BMLT-Honors		**Current Academic Year: 2021-22**	
Branch: Medical Lab Technology-Honors		**Semester: 4**	
1	Course Code	**BMH 210**	
2	Course Title	**PATHOLOGY-IV**	
3	Credits	**4**	
4	Contact Hours (L-T-P)	**2-2-0**	
	Course Status	Compulsory	
5	Course Objective	• To introduce basic principles and application relevance of clinical disease for students who are in preparation for laboratory technologists. • The content of rigorous course provide knowledge of the structure and function of the major organ systems, including the molecular, biochemical and cellular mechanisms for maintaining homeostasis. • It also provide knowledge of the pathogenesis of diseases, interventions for effective treatment, and mechanisms of health maintenance to prevent disease. • The student will be able to properly order and interpret hematologic and coagulation tests, including CBC's, PT's, INR's, and APTT's, for the proper diagnosis and effective treatment of	

		patients with hematologic, bleeding, and thrombotic disorders.	
6	Course Outcomes	CO1: To understand the importance of Instrumentation CO2: To understand the importance of basic techniques CO3: To understand the importance of staining technique CO4: To understand the importance of mounting technique CO5: To understand the importance of record maintenance	
7	Course Description	• Instrumentation : • Techniques • Staining techniques • Mounting techniques • Maintenance of records and computer application	
8	Outline syllabus **Theory**		CO mapping
	Unit 1	**Instrumentation :**	CO1
		a) Automated tissue processor, Microtomes, knives, knife sharpeners and ultra-microtome b) Freezing microtome and cryostat c) Automatic slide stainer	
	Unit 2	**Techniques**	CO2
		a) Routine paraffin section cutting. b) Frozen section c) Cryostat section studies	
	Unit 3	**Staining techniques**	CO3

		a) Special stains for carbohydrates, b) Special stain for connective tissue, nervous tissue, bone tissue, collagen fibres, elastic fibres etc. c) Special stains for lipids, organisms, fungi, parasites, pigments and deposits in tissues	
	Unit 4	**Mounting techniques**	CO4
		a) Various mounts and mounting techniques b) .Electron microscope, scanning electron microscope, dark ground and Fluorescent microscope c) Museum technology	
	Unit 5	, **Maintenance of records and computer application:**	CO5
		a) Microphotography and its applications, maintenance of records and filing of slides b) ICDs classification and coding c) Application of computers in pathology.	
	Course Code	**BMH 255**	
	Course Title	**PATHOLOGY –IV (LAB)**	
	Credits	**1**	
	Contact Hours (L-T-P)	**0-0-2**	
	Course Outcomes	CO1: To understand the importance of Paraffin section cutting CO2: To understand the importance of haematoxylin	

		staining CO3: To understand the importance of Eosin staining. CO4: To understand the importance of other special stains CO5: To understand the importance of mounting techniques	
	Course Description	• Paraffin section cutting • Staining by Haematoxylin • Staining by Eosin • Other special stains • Mounting techniques	
	Practical's		CO mapping
	Unit 1	Paraffin section cutting	CO1
		a) Briefing b) Demonstration c) Practical	
	Unit 2	Staining by Haematoxylin	CO2
		a) Briefing b) Demonstration c) Practical	
	Unit 3	Staining by Eosin	CO3
		a) Briefing b) Demonstration c) Practical	
	Unit 4	Other special stains	CO4
		a) Briefing b) Demonstration c) Practical	

	Unit 5	Mounting techniques			CO5
		a) Briefing b) Demonstration c) Practical			
	Mode of examination	Theory and Practical			
	Weightage Distribution for Theory	CA	MTE	ETE	
		30%	20%	50%	
	Weightage Distribution for Practical's	CA	MTE	ETE	
		60%	0%	40%	
	Text book/s*	1. Histopathology Techniques by Culling 2. Cytology by Koss 3. Clinical diagnosis by Laboratory method by Todd and Sanford 4. Laboratory Technology by RamnicSood 5. Practical Hematology by Dacie and Lewis 6. Text book of Pathology by Krishna			

BMH 211- MICROBIOLOGY-IV& BMH 256- MICROBIOLOGY-IV (LAB)

School: SAHS	**Batch : 2020-23**	
Program: BMLT-Honors	**Current Academic Year: 2021-22**	

Branch: Medical Lab Technology-Honors		Semester: 4	
1	Course Code	**BMH 211**	
2	Course Title	**MICROBIOLOGY-IV**	
3	Credits	**4**	
4	Contact Hours (L-T-P)	**2-2-0**	
	Course Status	Compulsory	
5	Course Objective	• To introduce basic principles and application relevance of clinical disease for students who are in preparation for lab technologists. • To know many etiological agents responsible for global infectious diseases caused by bacteria, viruses and other pathogens related with infectious diseases in humans. • To provide the conceptual basis for understanding pathogenic microorganisms and particularly address the fundamental mechanisms of their pathogenicity. • To provide opportunities for a student to develop diagnostic skills in microbiology, including the practical application and interpretation of laboratory tests for the diagnosis of infectious diseases	
6	Course Outcomes	CO1: To know the importance of Bacteriology CO2:To know the importance ofVirology CO3:To know the importance of Parasitology CO4:To know the diagnosis and treatment of Dengue, Chikungunya	

		CO5: To know the diagnosis and treatment of Rabies, Rotavirus	
7	Course Description	• Bacteriology:Chlamydia, Gonococci, Spirochaetes, Meningococci • Corynebacterium, Pseudomonas, Camplyobacter,Helicobacte. • Parasitology:Leishmaniasis and Filariasis • Virology: Introduction, classification, general features, pathogenicity, diagnosis, treatment and prevention of Adenovirus, Picornavirus: Poliovirus, Coxsackievirus, Poxvirus, Arbovirus- Dengue, Chikungunya • Rabies, Parvovirus,Coronavirus: SARS and Rotavirus	
8	Outline syllabus **Theory**		CO mapping
	Unit 1	**Bacteriology 1**	CO1
		a) Introduction and classification b) General features and pathogenicity c) Diagnosis, treatment and prevention of ChlamydiaGonococci, Spirochaetes, Meningococci	
	Unit 2	**Bacteriology 2**	CO2
		a) Introduction and classification b) General features and pathogenicity c) Diagnosis, treatment and prevention of Corynebacterium,nPseudomonas, Camplyobacter.Helicobacter	
	Unit 3	**Parasitology**	CO3
		a) Introduction and classification b) General features and pathogenicity c) Diagnosis, treatment and prevention ofLeishmaniasis and Filariasis	
	Unit 4	**Virology-1**	CO4

		a) Introduction and classification b) General features and pathogenicity, c) Diagnosis, treatment and prevention(Adenovirus,Picornavirus: Poliovirus, Coxsackievirus, Poxvirus, Arbovirus- Dengue, Chikungunya).	
	Unit 5	**Virology-2**	CO5
		a) Introduction and classification b) General features and pathogenicity c) Diagnosis, treatment and prevention of Rabies, Parvovirus, Coronavirus: SARS and Rotavirus	
	Course Code	**BMH 256**	
	Course Title	**MICROBIOLOGY –IV (LAB)**	
	Credits	**1**	
	Contact Hours (L-T-P)	**0-0-2**	
	Course Outcomes	CO1: To know about importance of Weil-Felix Test CO2: To know the detection of HBSAg, HCV, HIV, Dengue and Malaria. CO3: To know the Preparation and Examination of Blood Smear. CO4: To know the importance of stool examination CO5:To know the importance of KOH mount	
	Course Description	• Weil-Felix Test • Kit Based Detection Methods (HBSAg, HCV, HIV, Dengue, Malaria) • Preparation and Examination of Blood Smear • Rapid Plasma Regain (RPR) and Stool Examination • KOH Mount and Lacto phenol Cotton Blue (LCB) Wet Mount	

	Practical's				CO mapping
	Unit 1	Weil-Felix Test			CO1
		a. Briefing b. Demonstration c. Practical			
	Unit 2	Kit Based Detection Methods (HBSAg, HCV, HIV, Dengue, Malaria)			CO2
		a) Briefing b) Demonstration c) Practical			
	Unit 3	Preparation and Examination of Blood Smear			CO3
		a) Briefing b) Demonstration c) Smear preparation			
	Unit 4	Rapid Plasma Regain (RPR) and Stool Examination			CO4
		a) Briefing b) Demonstration c) Practical			
	Unit 5	KOH Mount and Lacto phenol Cotton Blue (LCB) Wet Mount			CO5
		a) Briefing b) Demonstration c) Practical			
	Mode of examination	Theory and Practical			
	Weightage Distribution for Theory	CA	MTE	ETE	
		30%	20%	50%	
	Weightage Distribution for Practical's	CA	MTE	ETE	
		60%	0%	40%	
	Text book/s*	1. Medical Microbiology by Anathanarayana and Panikar 2. Medical Microbiology –The practice of medical Microbiology by RobertyCruckshank			

		3. Parasitology – Interpretation to Clinical Medicine by Chatterjee 4. Medical Mycology by Rippon 5. Medical Paristology by AjitDamle	

School: SAHS			
Program: BMLT		**Current Academic Year: 2020-21**	
Branch:		**Semester: IVth**	
1	Course Code	BMT 033	
2	Course Title	Clinical Pharmacology	
3	Credits	3	
4	Contact Hours (L)		
	Course Type		
5	Course Objective	At the end of the course the students will be equipped with the basics knowledge about Pharmacology which would lay the foundation for their courses in the next semester.	
6	Course Outcomes	CO1: Basic information about Pharmacokinetic CO: Basic information about Pharmacodynamic CO3: Basic information about the drugs for treatment of Cardiovascular diseases and their usage and adverse effect CO4: Basic information about the drugs for treatment of respiratory and GI diseases and their usage and adverse effect CO5: Basic information about the antimicrobial agents and their usage and adverse effect	
7	Course Description	At the end of the course the students will be equipped with the basic's knowledge about certain concepts, which would lay the foundation for their courses in the next semester.	
8	Outline syllabus		CO Mapping
	Unit 1	**Pharmacokinetic**	
	A	Pharmacokinetics of drug absorption, distribution,	CO1
	B	biotransformation and Factors influencing drug metabolism of drug action	CO1
	C	excretion and toxicity,	CO1
	Unit 2	**Pharmacodynamic**	
	A	Drug action and effectiveness	CO2
	B	Drug safety; Factors influencing the objectively demonstrated response.	CO2
	C	Pharmacodynamic	CO2
	Unit 3	**Drugs affecting blood and cardiovascular system**	

	A	Drugs used in Hypertension	CO3
	B	Drugs affecting Coagulation	CO3
	C	Drugs used in Heart Failure	CO3
	Unit 4	**Drugs affecting Respiratory system and GIT**	
	A	Drugs used in Asthma and COPD	CO4
	B	Drugs for Peptic Ulcer	CO4
	C	Drugs for Diarrhea and Constipations	CO4
	Unit 5	**Antimicrobial and Anti- inflammatory Drugs**	
	A	Introductions to Anti-microbial drugs	CO5
	B	Anti-Fungal Drugs	CO5
	C	NSAID	CO5
	Mode of examination	Assignment	
	Weightage Distribution	CA 50%	
	Text book/s*	K D TRIPATHI: Essentials of Medical Pharmacology. 5th edition, Jaypee, New Delhi, 2004 Pharmacology &Pharmacotherapeutics by R. S. Satoskar Essentials of Pharmacotherapeutics by F. S. K. Barar	

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	3	3	3	3
CO2	3	3	2	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	2	3

BMH 306: BIOCHEMISTRY- V&BMH 351: BIOCHEMISTRY- V (Lab)

School: SAHS		**Batch : 2020-23**	
Program: BMLT-Honors		**Current Academic Year: 2022-23**	
Branch: Medical Lab Technology-Honors		**Semester: 5**	
1	Course Code	**BMH 306**	
2	Course Title	**BIOCHEMISTRY -V**	
3	Credits	**4**	

4	Contact Hours (L-T-P)	**2-2-0**	
	Course Status	Compulsory	
5	Course Objective	• To train the students in the management of medical laboratory along with handling a variety of laboratory chemicals and instruments including electronic and advanced equipment's used in modern medical laboratories. • To make the students able to do routine laboratory testing under stipulated conditions. • To prepare specimens and operate machines that automatically analyse samples. • To provide the conceptual basis for understanding biochemical and particularly address the fundamental mechanisms of the biomolecules to facilitate the life. • To develop diagnostic skills in clinical biochemistry and to provide an advanced understanding of the core principles and topics of Biochemistry and their experimental basis.	
6	Course Outcomes	CO1: To understand the importance of Protein chemistry and metabolism CO2: To understand the importance of Specialized product and Inborn error of Protein metabolism CO3: To understand the importance of Liver function test, Renal function test, Gastric function test CO4: To understand the importance of Cardiac Marker and Thyroid function test CO5: To understand the importance of Quality control and Preparation of reagents	
7	Course Description	• Chemistry and metabolism of amino acid and proteins • Specialized product and Inborn error of Protein metabolism • Liver function test, Renal function test, Gastric function test	

		• Cardiac Marker and Thyroid function test • Quality control and Preparation of reagents	
8	Outline syllabus **Theory**		CO mapping
	Unit 1	**Chemistry and metabolism of amino acid and proteins**	CO1
		a. Amino acid chemistry: Definition, Classification, Peptide bonds. Peptides: Definition, Biologically important peptides. Protein chemistry: Definition, Classification, Functions of proteins, Primary, Secondary, tertiary and quaternary structure of proteins. b. Digestion of protein and absorption of amino acid c. Catabolism of Protein and detoxification of ammonia along with clinical disorders of Urea cycle.	
	Unit 2	**Specialized product and Inborn error of Protein metabolism**	CO2
		a. Formation, function and clinical significance of specialized product of amino acids (NO, Creatin, Glutathione, Thyroid hormone, Melanin, Serotonin etc.) b. Inborn error of protein metabolism (Deficiency manifestation, treatment and screening) c. Albinism, Alkaptonuria, Cystinuria, Phenyl ketonuria, MSUD (Clinical manifestation)	
	Unit 3	**Liver function test, Renal function test, Gastric function test**	CO3
		a. Function of liver and kidney b. Tests used for diagnosis of liver and kidney diseases c. Gastric function Test and its Clinical interpretation	
	Unit 4	**Cardiac Marker and Thyroid function test**	CO4
		a. Importance of cardiac marker	

		b. Clinically important cardiac markers c. T3, T4 and TSH levels and their importance.	
	Unit 5	**Quality control and Preparation of reagents**	CO5
		a. Terminology used in Quality control, EQAS and IQAS, LJ chart and ISO. b. Preparation of stock solution of different concentration. c. Preparation of working standard solution of different concentration.	
1	**Course Code**	**BMH351**	
2	**Course Title**	**BIOCHEMISTRY –V (LAB)**	
3	**Credits**	**1**	
4	**Contact Hours (L-T-P)**	**0-0-2**	
5	Course Outcomes	CO1: To understand the importance of Preparation of protein free filtrate CO2: To understand the importance of Glucose estimation and Glucose tolerance test CO3: To understand the importance of Total protein estimation CO4: To understand the importance of albumin and globulin estimation CO5: To understand the clinical importance of A:G ratio	
6	Course Description	• Preparation of protein free filtrate • Glucose estimation and Glucose tolerance test • Total protein estimation • Albumin estimation • A:G ratio determination	
	Practical's		CO mapping

	Unit 1	Preparation of protein free filtrate			CO1
		a. Briefing b. Demonstration c. Practical			
	Unit 2	Quantitative estimation of Glucose			CO2
		a. Glucose estimation in normal sample b. Glucose estimation in abnormal sample c. Glucose estimation in unknown sample			
	Unit 3	Glucose tolerance test			CO3
		a. Briefing b. Demonstration c. Practical and Clinical interpretation of curve			
	Unit 4	Quantitative estimation of Total Protein			CO4
		a. Total protein estimation in normal sample b. Total protein estimation in abnormal sample c. Total protein estimation in unknown sample			
	Unit 5	Albumin, Globulin and A: G ratio determination			CO5
		a. Estimation of Albumin b. Determination of Globulin concentration c. Calculation of A: G ratio			
	Mode of examination	Theory and Practical			
	Weightage Distribution for Theory	CA	MTE	ETE	
		30%	20%	50%	
	Weightage Distribution for Practical's	CA	MTE	ETE	
		60%	0%	40%	

	Text book/s*	1. A text book of Medical Biochemistry by Chatterjee&Shinde 2. Text book of biochemistry for Medical students by Vasudevan and Sreekumari 3. Biochemistry by Lehringer 4. Clinical chemistry by Varley 5. Harpers Illustrated Biochemistry by Robert K.M.	

School: SAHS		**Batch : 2020-23**	
Program: BMLT-Honors		**Current Academic Year: 2022-23**	
Branch: Medical Lab Technology-Honors		**Semester: 5**	
1	Course Code	**BMH 307**	
2	Course Title	**PATHOLOGY-V**	
3	Credits	**4**	
4	Contact Hours (L-T-P)	**2-2-0**	
	Course Status	Compulsory	
5	Course Objective	• To introduce basic principles and application relevance of clinical disease for students who are in preparation for laboratory technologists. • The content of rigorous course provide knowledge of the structure and function of the major organ systems, including the molecular, biochemical and cellular mechanisms for maintaining homeostasis. • It also provide knowledge of the pathogenesis of diseases, interventions for effective treatment, and mechanisms of health maintenance to prevent disease. • The student will be able to properly order and interpret hematologic and coagulation tests, including CBC's, PT's, INR's, and APTT's, for the proper diagnosis and effective treatment of	

		patients with hematologic, bleeding, and thrombotic disorders.	
6	Course Outcomes	CO1: To understand the importance of Cytology CO2: To understand the importance of Female genital tract CO3: To understand the importance of Respiratory tract, gastrointestinal tract and urinary tract CO4: To understand the importance of CSF, Cytology of glands and automation in cytology CO5: To understand the importance of anaemia, leukaemiaand immunohistochemistry	
7	Course Description	• Cytology • Female genital tract • Respiratory tract, gastrointestinal tract and urinary tract • CSF, Cytology of glands and automation in cytology • Tissue culture, cytogenetics and immunohistochemistry	
8	Outline syllabus **Theory**		CO mapping
	Unit 1	**Cytology**	CO1
		1. Normal cell structure, functions, cytological criteria of malignancy. Types of specimens, methods of collection &preparation of cell block 2. Different fixatives and methods of fixation 3. Staining : (a) Papanicoloau's stain- principle , preparation and staining techniques (b) May GrunwaldGiemsa stain (c) Shorr's stain	

		(d) AcetoOrcin stain	
	Unit 2	**Female genital tract**	CO2
		1. Anatomy, histology, physiology & normal cytology. Techniques of collection of specimen for cervical cytology study. 2. Hormonal cytology and cytological indices. Cervical cytology screening for malignant and non-malignant conditions,Radiation changes & follow up. 3. Cytology of endometrium – normal,non-malignant and in malignant conditions.Cytology in ovarian cancers	
	Unit 3	**Respiratory tract, gastrointestinal tract and urinary tract**	CO3
		1. Anatomy, histology and physiology 2. Collection of sample, preparation of smears and staining 3. Cytology of normal, non-malignant& malignant conditions	
	Unit 4	**CSF, Cytology of glands and automation in cytology**	CO4
		1. CSF and effusions: a) Cytology of CSF in inflammatory, non-	

		malignant& malignant conditions b) Cytology of effusions in non-malignant and malignant conditions 2. Glands – breast, thyroid, salivary glands and lymph nodes. Cryptologic features in non-malignant and malignant conditions of different glands and nippledischarges 3. Automation in cytology a) Flow cytometry b) Image analysis c) Principles, equipment's, procedures & evaluation	
	Unit 5	**Anaemia's, Leukaemia's and immunohistochemistry**	CO5
		1. Anaemia's a. Various indices of blood b. Morphological classification of anaemia c. Etiological classification of anaemia d. Deficiency anaemia e. Haemolyticanaemia's 2. Leukaemia's a. Classification	

		b. ALL and AML their lab diagnosis c. CML and CLL their lab diagnosis 3.. Immunohistochemistry a. Fluorescence reactions b. Basics concepts of immunocytochemistry c. Monoclonal antibodies & its preparation	
	Course Code	**BMH 352**	
	Course Title	**PATHOLOGY –V (LAB)**	
	Credits	**1**	
	Contact Hours (L-T-P)	**0-0-2**	
	Course Outcomes	CO1: To understand the importance of smear preparation CO2: To understand the importance of fixation of smear CO3: To understand the importance of Papanicoloau staining CO4: To understand the importance of May-GrunwaldGeimsa staining CO5: To understand the importance of study of hormonal cytology	
	Course Description	• Preparation of various cytology smears • Fixation of smears • Papanicoloau staining • May-GrunwaldGeimsa staining • Hormonal cytology study	
	Practical's		CO mapping
	Unit 1	Preparation of various cytology smears	CO1

		a) Briefing b) Demonstration c) Preparation of smear			
	Unit 2	Fixation of smears			CO2
		a) Briefing b) Demonstration c) Fixation of smear			
	Unit 3	Papanicoloau staining			CO3
		a) Briefing b) Demonstration c) Staining			
	Unit 4	May-GrunwaldGeimsa staining			CO4
		a) Briefing b) Demonstration c) Staining			
	Unit 5	Hormonal cytology study			CO5
		a) Briefing b) Demonstration c) Practical			
	Mode of examination	Theory and Practical			
	Weightage Distribution for Theory	CA	MTE	ETE	
		30%	20%	50%	

	Weightage Distribution for Practical's	CA	MTE	ETE	
		60%	0%	40%	
	Text book/s*	1. Histopathology Techniques by Culling 2. Cytology by Koss 3. Clinical diagnosis by Laboratory method by Todd and Sanford 4. Laboratory Technology by RamnicSood 5. Practical Hematology by Dacie and Lewis 6. Text book of Pathology by Krishna			

BMH 308- MICROBIOLOGY-V& BMH 353- MICROBIOLOGY-V (LAB)

School: SAHS		**Batch : 2020-23**	
Program: BMLT-Honors		**Current Academic Year: 2022-23**	
Branch: Medical Lab Technology-Honors		**Semester: 5**	
1	Course Code	**BMH 308**	
2	Course Title	**MICROBIOLOGY-V**	
3	Credits	**4**	
4	Contact Hours (L-T-P)	**2-2-0**	
	Course Status	Compulsory	
5	Course Objective	• To introduce basic principles and application relevance of clinical disease for students who are in preparation for lab technologists. • To know many etiological agents responsible for global infectious diseases caused by bacteria, viruses and other pathogens related with infectious diseases in humans. • To provide the conceptual basis for	

		understanding pathogenic microorganisms and particularly address the fundamental mechanisms of their pathogenicity. • To provide opportunities for a student to develop diagnostic skills in microbiology, including the practical application and interpretation of laboratory tests for the diagnosis of infectious diseases	
6	Course Outcomes	CO1: To know the importance of host pathogen infection CO2: To know the importance of various types of infection. CO3: To know the importance of Sexually transmitted infections CO4: To know the mechanism of hospital acquired infection CO5:To know the importance of Laboratory diagnosis	
7	Course Description	• Host pathogen infection • Gastro intestinal infections • Sexually transmitted infections • Skin and soft tissue infections • Laboratory diagnosis, their interpretation and comparative evaluation	
8	Outline syllabus **Theory**		CO mapping
	Unit 1		CO1
		1. Host pathogeninteraction 2. Respiratory tract infections 3. Blood stream infections	
	Unit 2		CO2
		1. Hospital acquired infection 2. Gastro intestinal infections 3. Sexually transmitted infections	

	Unit 3		CO3
		1. Skin infection 2. Soft tissue infections 3. Zoonoses	
	Unit 4		CO4
		1. Laboratory diagnosis of infection 2. Interpretation of infected case 3. Comparative evaluation	
	Unit 5		CO5
		1. Serological test 2. Antibiotic susceptibility test 3. Widal test	
	Course Code	**BMT 353**	
	Course Title	**MICROBIOLOGY –V (LAB)**	
	Credits	**1**	
	Contact Hours (L-T-P)	**0-0-2**	
	Course Outcomes	CO1: To know about importance of Antibiotic susceptibility test (AST) CO2: To know the importance of Sensitivity and specificity of different diagnostic test CO3: To know the process of collection and transportation of clinical specimens CO4: To know the importance of central instrument facility CO5:To know the importance of exposure to clinical microbiology labs	

	Course Description	• Antibiotic susceptibility test (AST) • Sensitivity and specificity of different diagnostic test • Concepts for analysis with reference to the collection and transportation of clinical specimens • Visit to central instrument facility • Visit to Clinical Microbiology labs	
	Practical's		CO mapping
	Unit 1	Antibiotic susceptibility test (AST)	CO1
		a. Briefing b. Demonstration c. Practical	
	Unit 2	Sensitivity and specificity of different diagnostic test	CO2
		a. Briefing b. Demonstration c. Practical	
	Unit 3	Concepts for analysis with reference to the collection and transportation of clinical specimens	CO3
		a. Briefing b. Demonstration c. Hands on practice	
	Unit 4	Visit to central instrument facility	CO4
		a. Briefing b. Demonstration c. Hands on practice in lab	
	Unit 5	Visit to Clinical Microbiology labs	CO5
		a. Briefing b. Demonstration c. Hands on practice in lab	
	Mode of examination	Theory and Practical	

	Weightage Distribution for Theory	CA	MTE	ETE	
		30%	20%	50%	
	Weightage Distribution for Practical's	CA	MTE	ETE	
		60%	0%	40%	
	Text book/s*	1. Medical Microbiology by Anathanarayana and Panikar 2. Medical Microbiology –The practice of medical Microbiology by RobertyCruckshank 3. Parasitology – Interpretation to Clinical Medicine by Chatterjee 4. Medical Mycology by Rippon 5. Medical Paristology by AjitDamle			

Forensic Science (BMH 044)

T-1 P-0THEORY

1) Introduction of history of Forensic Medicine
2) Legal procedures in medico-legal cases
3) Legal and ethical aspects of laboratory practices
4) Forensic Science Laboratory

Forensic Science (BMH 044)

School: SAHS		**Batch: 2021 – 22**
Program:		**Current Academic Year: 2021-22**
Branch:		
1	Course Code	
2	Course Title	Forensic Science
3	Credits	3
4	Contact Hours (L-T-P)	2-1-0
	Course Type	Compulsory
5	Course Objective	1. Able to explain the Forensic Medicine. 2. Describes medico-legal aspects of Death. 3. Gaining insight into evidences and legal system.

6	Course Outcomes	CO1: They all have knowledge the basic concept, meaning, significance and development of Forensic science. CO2:Able to describe all changes in body after death CO3: Define the Function of Legal aspects of Forensic Science CO4: Knowledge about forensic science labs.	
7	Course Description	After Completion of this course is to introduce the concept of forensic medicine, its development and progress over time and also aboutthe medico-legal aspects.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction of history of Forensic Medicine**	
	A	Introduction to forensic medicine	CO1
	B	History related to forensic medicine	CO1
	C	Scientist and related discovery.	CO1
	Unit 2	**Legal procedures in medico-legal cases**	
	A	Medico legal investigation of sexual offences, includingexamination of victims and suspects.	CO2
	B	Medico legal aspects of death: - causes of death such asasphyxia, thermal trauma, heat burns, starvation, naturaldeath, sudden death, death by accident.	CO4
	C	Medico legal aspects of wounds: - medical and legal Definition of wounds, types of mechanical and regionalinjuries, aging of wounds, difference between suicidal,homicidal and accidental wounds.	CO2
	Unit 3	**Legal and ethical aspects of laboratory practices**	
	A	Global Medical Jurisprudence, Legal Procedure in India: Police inquest, Magistrate's inquest, Coroner's inquest,Oath and affirmation.	CO2

	B	Documentary evidence: - Medical certificates, medical Reports, dying declaration. Understanding laws and ethicsof medical practice.			CO2
	C	Medico legal aspects of death: - Diagnosis of death- somatic & molecular,early and intermediate changesfollowing death, late changes after death- putrefaction,autolysis, bacterial action, factors affecting these changes.Determination of time since death, including byhistopathological methods.			CO1
	Unit 4	**Forensic Science Laboratory**			
	A	Judicial Officers and Medico legal expert etc. Role and Qualifications of Forensic Scientists.			CO1
	B	Code of conduct for Forensic Scientists, Ethical issue inForensic Science, professional structure and function ofstate and regional Forensic Science Laboratory, CentralForensic Science Laboratory and facility provided, MobileForensic Science Laboratory. Directorate of ForensicScience Service.			CO1
	C	Police and Forensic Scientist Relationship, Role of FSL incriminal investigation, Relationship between Forensicexpert and judiciary officer, Importance of FSL, Nationaland International scenario of FSL, facilities provided inFSL.			CO3
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	

BMH 309: BIOCHEMISTRY- VI&BMH 354: BIOCHEMISTRY- VI (Lab)

School: SAHS		**Batch : 2020-23**	
Program: BMLT-Honors		**Current Academic Year: 2022-23**	
Branch: Medical Lab Technology-Honors		**Semester: 6**	
1	Course Code	**BMH 309**	
2	Course Title	**BIOCHEMISTRY -VI**	
3	Credits	**4**	
4	Contact Hours (L-T-P)	**2-2-0**	
	Course Status	Compulsory	
5	Course Objective	• To train the students in the management of medical laboratory along with handling a variety of laboratory chemicals and instruments including electronic and advanced equipment's used in modern medical laboratories. • To make the students able to do routine laboratory testing under stipulated conditions. • To prepare specimens and operate machines that automatically analyse samples. • To provide the conceptual basis for understanding biochemical and particularly address the fundamental mechanisms of the biomolecules to facilitate the life. • To develop diagnostic skills in clinical biochemistry and to provide an advanced understanding of the core principles and topics of Biochemistry and their experimental basis.	
6	Course Outcomes	CO1: To understand the importance of Molecular Biology CO2: To understand the concept and importance of Immunology CO3: To understand the importance of Acid base balance and Detoxification reaction	

		CO4: To understand the importance of Recombinant DNA technology and Application of genetic engineering CO5: To understand the importance of Techniques and Biostatistics	
7	Course Description	• Molecular biology • Immunology • Acid base balance and Detoxification • Recombinant DNA technology and Application of genetic engineering • Techniques and Biostatistics	
8	Outline syllabus **Theory**		CO mapping
	Unit 1	**Molecular biology**	CO1
		1. Structure, function and types of DNA and RNA 2. Replication, Transcription, Genetic code and Translation. 3. Post transcriptional and post translational modification, Mutation.	
	Unit 2	**Immunology**	CO2
		1. Active and Passive immunity. Antigen and Antibody 2. Cell mediated immunity, Epitope, Immunogenicity 3. Diagnostic immunological test (ELISA, RIA), Hybridoma technology	
	Unit 3	**Acid Base balance and Detoxification**	CO3
		1. pH, Concept of Acid and Bases 2. Body buffers, Acidosis and Alkalosis 3. Phase 1 and Phase 2 detoxification reactions,	

		Cytochrome P450	
	Unit 4	**Recombinant DNA technology and Application of genetic engineering**	CO4
		1. Recombinant DNA synthesis, Genetic engineering 2. Vector, Cosmid, Plasmid, 3. DNA library, Gene cloning, PCR, cDNA synthesis, Gene therapy, DNA fingerprinting, RFLP.	
	Unit 5	**Techniques and Biostatistics**	CO5
		1. Southern, Northern and Western blotting 2. Chromatography, Electrophoresis 3. Mean, Median, Mode, Standard Deviation, Variance, Correlation coefficient.	
1	**Course Code**	**BMH354**	
2	**Course Title**	**BIOCHEMISTRY –VI (LAB)**	
3	**Credits**	**1**	
4	**Contact Hours (L-T-P)**	**0-0-2**	
5	Course Outcomes	CO1: To understand the importance of Urea, uric acid and creatinine estimation CO2: To understand the importance of Clearance test CO3: To understand the use of enzymatic kit in enzyme activity estimation CO4: To understand the importance of urine analysis in disease diagnosis CO5: To understand the importance of Lipid profile and CSF analysis.	
6	Course Description	• Urea estimation and Creatinine estimation • Clearance test • Estimation of enzymes and Uric acid by kit method	

		• Urine analysis • Lipid profile and CSF analysis	
	Practical's		CO mapping
	Unit 1	**Urea estimation and Creatinine estimation**	CO1
		a. Estimation of Urea and Creatinine in normal sample b. Estimation of Urea and Creatinine in abnormal sample c. Estimation of Urea and Creatinine in unknown sample	
	Unit 2	**Clearance test**	CO2
		a. Briefing of clearance test b. Perform and calculate Urea clearance test c. Perform and calculate Creatinine clearance test	
	Unit 3	**Estimation of enzymes and Uric acid by kit method**	CO3
		a) Estimation of SGPT and SGOT by kit method b) Estimation of LDH and Amylase by kit method c) Estimation of Uric acid by kit method	
	Unit 4	Urine analysis	CO4
		a. Physical properties of urine b. Normal constituent of urine c. Abnormal constituent of urine	
	Unit 5	Lipid profile and CSF analysis	CO5
		a. Total cholesterol, TG and HDL estimation b. Calculation of LDL and VLDL c. Collection of CSF and CSF protein analysis	

	Mode of examination	Theory and Practical			
	Weightage Distribution for Theory	CA	MTE	ETE	
		30%	20%	50%	
	Weightage Distribution for Practical's	CA	MTE	ETE	
		60%	0%	40%	
	Text book/s*	1. A text book of Medical Biochemistry by Chatterjee&Shinde 2. Text book of biochemistry for Medical students by Vasudevan and Sreekumari 3. Biochemistry by Lehringer 4. Clinical chemistry by Varley 5. Harpers Illustrated Biochemistry by Robert K.M.			

BMH 310: PATHOLOGY- VI&BMH 355: PATHOLOGY- VI (Lab)

School: SAHS		**Batch : 2020-23**	
Program: BMLT-Honors		**Current Academic Year: 2022-23**	
Branch: Medical Lab Technology-Honors		**Semester: 6**	
1	Course Code	**BMH 310**	
2	Course Title	**PATHOLOGY-VI**	
3	Credits	**4**	
4	Contact Hours (L-T-P)	**2-2-0**	
	Course Status	Compulsory	
5	Course Objective	• To introduce basic principles and application relevance of clinical disease for students who are in preparation for laboratory technologists. • The content of rigorous course provide knowledge of the structure and function of the major organ systems, including the molecular, biochemical and cellular mechanisms for maintaining homeostasis. • It also provide knowledge of the pathogenesis of diseases, interventions for effective treatment, and mechanisms of health maintenance to prevent disease. • The student will be able to properly order and interpret hematologic and coagulation tests, including CBC's, PT's, INR's, and APTT's, for the proper diagnosis and effective treatment of	

		patients with hematologic, bleeding, and thrombotic disorders.	
6	Course Outcomes	CO1: To understand the importance of Cytogenetics CO2: To understand the importance of Immuno--cytochemistry CO3: To understand the importance of Immuno –-haematology CO4: To understand the importance of Blood transfusion CO5: To understand the importance of Blood bank	
7	Course Description	• Cytogenetics • Immunocytochemistry • Immunohematology • Blood transfusion • Blood Bank	
8	Outline syllabus **Theory**		CO mapping
	Unit 1	**Cytogenetics**	CO1
		1. Introduction to cytogenetics, terminology , classification and nomenclature of humanChromosomes 2. Methods of karyotypic analysis (culture of bone marrow cells, peripheral blood lymphocytes, solid tumours& skin fibroblasts, direct	

		preparation from tumour materials) 3. Characterization of human chromosomes by various banding techniques, Sex chromatin identification, Chromosomes in neoplasia and oncogenes.	
	Unit 2	**Immunocytochemistry**	CO2
		1. Basics concepts of Immunocytochemistry 2. Monoclonal antibodies & its preparation 3. Fluorescence reactions	
	Unit 3	**Immunohematology**	CO3
		1. ABO blood group and Rh system 2. Subgroups of A and B, other blood groups 3. HLA antigens and their significance	
	Unit 4	**Blood transfusion**	CO4
		1. Principles of blood transfusion (blood donor selection, methods of bleeding donors, blood containers, anticoagulants and storage of blood, Coomb's test and its significance) 2. Screening of blood for infective material, blood components, preparation & component therapy 3. Autologous transfusion, transfusion reactions and work up	

	Unit 5	**Blood bank**	CO5
		1. Blood bank organization, 2. Standards and procedures of blood bank 3. Techniques and quality control	
	Course Code	**BMH 355**	
	Course Title	**PATHOLOGY –VI (LAB)**	
	Credits	**1**	
	Contact Hours (L-T-P)	**0-0-2**	
	Course Outcomes	CO1: To understand the importance of blood grouping CO2: To understand the importance of Rh typing CO3: To understand the importance of Cross matching techniques CO4: To understand the importance of Transfusion reaction CO5: To understand the importance and process of Screening of donor's blood for infective agents	
	Course Description	• Blood grouping • Rh typing • Cross matching techniques • Transfusion reaction • Screening of donor's blood for infective agents	
	Practical's		CO mapping
	Unit 1	**Blood grouping**	CO1
		a. Briefing b. Demonstration c. Practical	

	Unit 2	**Rh typing**			CO2
		a. Briefing b. Demonstration c. Practical			
	Unit 3	**Cross matching techniques**			CO3
		a. Briefing b. Demonstration c. Practical			
	Unit 4	**Transfusion reaction**			CO4
		a. Briefing b. Demonstration c. Practical			
	Unit 5	**Screening of donor's blood for infective agents**			CO5
		a. Briefing b. Demonstration c. Practical			
	Mode of examination	Theory and Practical			
	Weightage Distribution for Theory	CA	MTE	ETE	
		30%	20%	50%	
	Weightage Distribution for Practical's	CA	MTE	ETE	
		60%	0%	40%	
	Text book/s*	1. Histopathology Techniques by Culling 2. Cytology by Koss 3. Clinical diagnosis by Laboratory method by Todd and Sanford 4. Laboratory Technology by RamnicSood 5. Practical Haematology by Dacie and Lewis 6. Text book of Pathology by Krishna			

BMH 311- MICROBIOLOGY-VI& BMH 356- MICROBIOLOGY-VI (LAB)

School: SAHS		**Batch : 2020-23**	
Program: BMLT-Honors		**Current Academic Year: 2022-23**	
Branch: Medical Lab Technology-Honors		**Semester: 6**	
1	Course Code	**BMH 311**	
2	Course Title	**MICROBIOLOGY-VI**	
3	Credits	**4**	
4	Contact Hours (L-T-P)	**2-2-0**	
	Course Status	Compulsory	
5	Course Objective	• To introduce basic principles and application relevance of clinical disease for students who are in preparation for lab technologists. • To know many etiological agents responsible for global infectious diseases caused by bacteria, viruses and other pathogens related with infectious diseases in humans. • To provide the conceptual basis for understanding pathogenic microorganisms and particularly address the fundamental mechanisms of their pathogenicity. • To provide opportunities for a student to develop diagnostic skills in microbiology, including the practical application and interpretation of laboratory tests for the diagnosis of infectious disease.	
6	Course Outcomes	CO1: To know the importance of bacteriology	

		CO2: To know the importance of immune system CO3: To know the importance of syndromic approach CO4: To know the mechanism of quality control CO5:To know the importance of molecular diagnostic tests	
7	Course Description	• Bacteriology • Immune system • Syndromic approach • Quality control • Molecular diagnostic tests	
8	Outline syllabus **Theory**		CO mapping
	Unit 1		CO1
		1. Normal microbial flora of human body 2. Bacteriology of water, 3. Bacteriology of milk	
	Unit 2		CO2
		1. Bacteriology of food 2. Function of immune system 3. Monoclonal and polyclonal Antibody	
	Unit 3	1. Antibody and its type 2. Emerging and re-emerging infections 3. Syndromic approach	CO3
	Unit 4		CO4
		1. Drug resistance 2. Laboratory control of antimicrobial therapy 3. Quality control	
	Unit 5		CO5
		1. Molecular diagnostic test 2. Recent advances in diagnostic microbiology 3. Automation in detection techniques	
	Course Code	**BMH 356**	

	Course Title	**MICROBIOLOGY –VI (LAB)**	
	Credits	**1**	
	Contact Hours (L-T-P)	**0-0-2**	
	Course Outcomes	CO1: To know about importance of Antibiotic susceptibility test (AST) CO2: To know the importance of Sensitivity and specificity of different diagnostic test CO3: To know the process of collection and transportation of clinical specimens CO4: To know the importance of central instrument facility CO5:To know the importance of exposure to clinical microbiology labs	
	Course Description	• Antibiotic susceptibility test (AST) • Sensitivity and specificity of different diagnostic test • Concepts for analysis with reference to the collection and transportation of clinical specimens • Visit to central instrument facility • Visit to Clinical Microbiology labs	
	Practical's		CO mapping
	Unit 1	Antibiotic susceptibility test (AST)	CO1
		a. Briefing b. Demonstration c. Practical	
	Unit 2	Sensitivity and specificity of different diagnostic test	CO2
		a. Briefing b. Demonstration c. Practical	
	Unit 3	Concepts for analysis with reference to the collection and transportation of clinical specimens	CO3
		a. Briefing b. Demonstration	

		c. Hands on practice			
	Unit 4	Visit to central instrument facility			CO4
		a. Briefing b. Demonstration c. Hands on practice in lab			
	Unit 5	Visit to Clinical Microbiology labs			CO5
		a. Briefing b. Demonstration c. Hands on practice in lab			
	Mode of examination	Theory and Practical			
	Weightage Distribution for Theory	CA	MTE	ETE	
		30%	20%	50%	
	Weightage Distribution for Practical's	CA	MTE	ETE	
		60%	0%	40%	
	Text book/s*	1. Medical Microbiology by Anathanarayana and Panikar 2. Medical Microbiology –The practice of medical Microbiology by RobertyCruckshank 3. Parasitology – Interpretation to Clinical Medicine by Chatterjee 4. Medical Mycology by Rippon 5. Medical Parasitology by AjitDamle			

BMH 312: Research Methodology

School: SAHS		**Batch : 2020-23**	
Program: BMLT-Honors		**Current Academic Year: 2022-23**	
Branch: Medical Lab Technology-Honors		**Semester: 3**	
1	Course Code	**BMH 312**	
2	Course Title	**RESEARCH METHODOLOGY**	
3	Credits	**3**	
4	Contact Hours (L-T-P)	**2-1-0**	
	Course Status	Pre requisite	
5	Course Objective	To develop the better understanding in Research To develop the skill of research To know the importance of seminar, conference and literature To develop the potential of independent researcher	
6	Course Outcomes	CO1: To know the use of subject verb agreement CO2: To know the importance of Active and Passive voice CO3: To know the application of Bioinformatics CO4: To know the implication of literature on research CO5: To understand the concept of seminar and conference	
7	Course Description	1) Basics of research 2) Research tools and its application 3) Conferences and seminars	

8	Outline syllabus **Theory**				
	Unit 1				**CO mapping**
		1) Description of research, 2) Types of research 3) Use of research in medical and laboratory sciences			CO1
	Unit 2				
		1) Research tools, 2) Bioinformatics 3) Importance of bioinformatics on research			CO2
	Unit 3				
		1) Role of seminar on research. 2) Role of conference on research. 3) Role of literature on research.			CO3
	Mode of examination	Jury/Viva			
	Weightage Distribution for Theory	CA	Viva	ETE	
		50%	50%	0%	
	Text book/s*	1. Research Methodology- CR Kothari 2. Statistics in Medicine-Colton-Little Brown. Boston			

Clinical Training and internship: Every student who has passed in all the theory and practical examinations of all the six semesters will have to undergo 06 month clinical training in at-least 250 bedded hospital as internship as per schedule finalized by the School of Allied Health Sciences authorities. Duration of internship can be extended up to 01 year, for National & International students also (on the request of student) in order to increase the employment opportunity and their higher study even at International level. No candidate shall be permitted to proceed to the internship of the course of study i.e. clinical training in hospital, unless he/she has passed in all the written theory and practical examinations conducted during the preceding three years of the course of study. Every student should attend his/her training in the associated training hospital as per the timings of those centers. The candidate shall maintain a **log book** forall the events of the respective posting. Logbook completed by the student in that training Centre will have to be countersigned by the Faculty or In-charge of that center. The Regular participation of students in seminars / case presentations is mandatory and aimed to encourage them in learning research and development programs in medical laboratory technology. On completion of the training, the log book submitted by each candidate will be evaluated by authorities and declared to be 'Satisfactory' or 'Not Satisfactory'.