Pre Revision

STUDY & EVALUATION SCHEME

OF

B.Sc. Medical Laboratory Technology (B.Sc. MLT)

[APPLICABLE W.E.F. ACADEMIC SESSION 2017-18 TILL REVISED]

TEERTHANKER MAHAVEER UNIVERSITY

Delhi Road, Moradabad, Uttar Pradesh

244001 Website: www.tmu.ac.in

Teerthanker Mahaveer University, Moradabad 244001 Registrar

B.Sc. MLT- I Semester (I Year)

S. No.	Course Code	Subject	Period			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	BML-S- 101	Human Anatomy-I	3	-	-	3	40	60	100
2	BML -S- 102	Human Physiology-I	3	-	-	3	40	60	100
3	BML-S- 103	Basic Haematology & Clinical Pathology-I	4	-	-	4	40	60	100
4	BML-S- 104	Fundamentals of Biochemistry-I	4	-	-	4	40	60	100
5	BML -S-105	Preventive Medicine & Community Health Care	3	-	-	3	40	60	100
6 *	*BML -S-199	*English Communication & Soft skills-I	3	-	2	4	50	50	100
7	BML-S- 151	Practical: Human Anatomy-I	-	-	2	1	50	50	100
8	BML-S- 152	Practical: Human Physiology-I	-	-	2	1	50	50	100
9	BML -S-153	Practical: Basic Haematology & Clinical Pathology-I	-	-	2	1	50	50	100
10	BML -S-154	Practical: Fundamentals of Biochemistry-I	-	-	2	1	50	50	100
11	BML-S-155	Hospital Posting	-	-	4	2	50	50	100
		Total	20	00	14	27	500	600	1100

Note: Two lectures per week are designated for Library/ Seminar/Group Discussion.
Subject marked with asterisk (*) is non-core paper.

Study & Evaluation Scheme

B.Sc. MLT- II Semester (I Year)

S. No.	Course Code	Subject	Period			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	BML –S-201	Human Anatomy-II	3	-	-	3	40	60	100
2	BML –S-202	Human Physiology-II	3	-	-	3	40	60	100
3	BML –S-203	Basic Haematology & Clinical Pathology-II	4	-	-	4	40	60	100
4	BML–S- 204	Fundamentals of Biochemistry-II	4	-	-	4	40	60	100
5	BML–S- 205	Fundamentals of Computer	3	-	-	3	40	60	100
6 *	*BML –S-299	*English Communication & Soft skills-I	3	-	2	4	50	50	100
7	BML –S-251	Practical: Human Physiology-II	-	-	2	1	50	50	100
8	BML –S-252	Practical: Basic Haematology & Clinical Pathology-II	-	-	2	1	50	50	100
9	BML –S-253	Practical: Fundamentals of Biochemistry-II	-	-	2	1	50	50	100
10	BML –S-254	Practical : Fundamentals of Computer	-	-	2	1	50	50	100
11	BML–S-255	Hospital posting	-	-	4	2	50	50	100
		Total	20	00	14	27	500	600	1100

Note: Two lectures per week are designated for Library/ Seminar/Group Discussion.
Subject marked with asterisk (*) is non-core paper.

Study & Evaluation Scheme

B.Sc. MLT- III Semester (2 Year)

S. No.	Course Code	Subject	Period			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	BML–S- 301	Clinical Haematology-I	3	-	-	3	40	60	100
2	BML–S- 302	Clinical Biochemistry-I	3	-	-	3	40	60	100
3	BML–S- 303	Fundamentals of Microbiology-I	2	-	-	2	40	60	100
4	BML –S- 304	Immunology & Serology-I	2	-	-	2	40	60	100
5	BML–S- 305	Histopathology & Histotechniques -I	3	-	-	3	40	60	100
6	BML –S- 399	English Communication & Soft skills-III	3	-	2	4	50	50	100
7	BML –S- 307	Environmental Sciences	4	-	-	4	40	60	100
8	BML–S- 351	Practical: Clinical Haematology-I	-	-	2	1	50	50	100
9	BML –S- 352	Practical: Clinical Biochemistry-I	-	-	2	1	50	50	100
10	BML–S- 353	Practical: Fundamentals of Microbiology-I & Immunology- I	-	-	2	1	50	50	100
11	BML –S- 354	Practical: Histopathology & Histotechniques -I	-	-	2	1	50	50	100
12	BML–S- 355	Hospital Posting	-	-	6	3	50	50	100
		Total	20	0	16	28	540	660	1200

Study & Evaluation Scheme

B.Sc. MLT- IV Semester (II Year)

S. No.	Course Code	Subject	Period			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	BML–S- 401	Clinical Haematology-II	3	-	-	3	40	60	100
2	BML–S- 402	Clinical Biochemistry-II	3	-	-	3	40	60	100
3	BML–S- 403	Fundamentals of Microbiology-II	3	-	-	3	40	60	100
4	BML–S- 404	Immunology & Serology-II	2	-	-	2	40	60	100
5	BML –S- 405	Histopathology & Histotechniques -I	2	-		2	40	60	100
6	BML –S- 499	English Communication & Soft skills-III	3	-	2	4	50	50	100
7	BML–S- 407	General Pathology	2	-	-	2	40	60	100
8	BML –S- 451	Practical: Clinical Haematology-II	-	-	2	1	50	50	100
9	BML –S- 452	Practical: Clinical Biochemistry-II	-	-	2	1	50	50	100
10	BML–S- 453	Practical: Fundamentals of Microbiology-II	-	-	2	1	50	50	100
11	BML–S- 454	Practical: Immunology & Serology -II	-	-	2	1	50	50	100
12	BML–S- 455	Practical: Histopathology & Histotechniques -I	-	-	2	1	50	50	100
13	BML–S- 456	Hospital Posting	-	-	6	3	50	50	100
		Total	18	0	18	27	590	710	1300

Study & Evaluation Scheme

B.Sc. MLT- V Semester (III Year)

S. No.	Course Code	Subject	Period			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	BML –S- 501	Immunohematology & Blood Banking	3	-	-	3	40	60	100
2	BML –S- 502	Clinical Enzymology & Automation	3	-	-	3	40	60	100
3	BML–S- 503	Medical Microbiology-I	3	-	-	3	40	60	100
4	BML –S- 504	Parasitology	3	-	-	3	40	60	100
5	BML–S- 505	Diagnostic Cytology	3	-	-	3	40	60	100
6	BML –S- 506	Principles of Laboratory Management	3	-	-	3	40	60	100
7	BML –S- 551	Practical: Immunohematology & Blood Banking	-	-	2	1	50	50	100
8	BML–S- 552	Practical: Clinical Enzymology	-	-	2	1	50	50	100
9	BML –S- 553	Practical: Medical Microbiology-I	-	-	2	1	50	50	100
10	BML–S- 554	Practical: Parasitology	-	-	2	1	50	50	100
11	BML–S- 555	Practical: Diagnostic Cytology-I	-	-	2	1	50	50	100
12	BML–S- 556	Hospital Posting	-	-	6	3	50	50	100
		Total	18	00	16	26	540	660	1200

Note: Two lectures per week are designated for Library/ Seminar/Group Discussion.

Study & Evaluation Scheme

B.Sc. MLT- VI Semester (III Year)

S. No.	Course Code	Subject	Period			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	BML–S- 601	Clinical Endocrinology & Toxicology	3	-	-	3	40	60	100
2	BML–S- 602	Advance Diagnostic Techniques	3	- -	-	3	40	60	100
3	BML–S- 603	Diagnostic Molecular Biology	3	-	-	3	40	60	100
4	BML–S- 604	Medical Microbiology-II	3	-	-	3	40	60	100
5	BML –S- 605	Clinical Virology	3	-	-	3	40	60	100
6	BML –S- 606	Biostatistics & Research Methodology	3	-	-	3	40	60	100
7	BML–S- 651	Practical: Clinical Endocrinology & Toxicology	-	-	2	1	50	50	100
8	BML–S- 652	Practical: Advance Techniques in Clinical Diagnosis	-	-	2	1	50	50	100
9	BML–S- 653	Practical: Diagnostic Molecular Biology	-	-	2	1	50	50	100
10	BML–S- 654	Practical: Medical Microbiology-II	-	-	2	1	50	50	100
11	BML–S- 655	Practical: Clinical Virology	-	-	2	1	50	50	100
12	BML –S- 656	Hospital Posting	-	-	6	3	50	50	100
		Total	18	0	16	26	540	660	1200

Note: Two lectures per week are designated for Library/ Seminar/Group Discussion.

Study & Evaluation Scheme

of

B.Sc. Medical Lab Techniques (B.Sc. MLT)

[Applicable W.E.F. Academic Session - 2019-20 till Revised]

[As per CBCS guidelines given by UGC]

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Study & Evaluation Scheme

B.Sc. MLT- Semester-I

S.N	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC-1	BML-S- 101	Human Anatomy-I	3	-	-	3	40	60	100
2	CC-2	BML -S-102	Human Physiology-I	3	-	-	3	40	60	100
3	DSC-1	BML-S- 103	Basic Haematology & Clinical Pathology-I	3	-	-	3	40	60	100
4	DSC-2	BML-S- 104	Fundamentals of Biochemistry-I	3	-	-	3	40	60	100
5	CC-3	BML -S-105	Preventive Medicine & Community Healthcare	3	-	-	3	40	60	100
6	DSC-3	BML -S-106	Fundamentals of Microbiology-I	3	-	-	3	40	60	100
7	AECC-1	TMUGE101	English communication-I	2	-	2	3	40	60	100
8	SEC-1	BML-S- 151	LAB: Human Anatomy-I	-	-	2	1	50	50	100
9	SEC-2	BML-S- 152	LAB: Human Physiology-I	-	-	2	1	50	50	100
10	SEC-3	BML-S- 153	LAB: Basic Haematology & Clinical Pathology-I	-	-	2	1	50	50	100
11	SEC-4	BML-S- 154	LAB: Fundamentals of Biochemistry-I	-	-	2	1	50	50	100
12	SEC-5	BML-S- 156	LAB: Fundamentals of Microbiology-I	-	-	2	1	50	50	100
			Total	**20**	**00**	**12**	**26**	**530**	**670**	**1200**

B.Sc. MLT -Semester II

S. N	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC-4	BML –S-201	Human Anatomy-II	3	-	-	3	40	60	100
2	CC-5	BML –S-202	Human Physiology-II	3	-	-	3	40	60	100
3	DSC-4	BML –S-203	Basic Haematology & Clinical Pathology-II	3	-	-	3	40	60	100
4	DSC-5	BML–S- 204	Fundamentals of Biochemistry-II	3	-	-	3	40	60	100
5	SEC-6	BML–S- 205	Fundamentals of Computer	3	-	-	3	40	60	100
6	DSC-6	BML–S- 206	Fundamentals of Microbiology-II	3	-	-	3	40	60	100
7	AECC-2	TMUGE201	English Communication- II	2	-	2	3	40	60	100
8	SEC-7	BML –S-251	LAB: Human Physiology- II	-	-	2	1	50	50	100
9	SEC-8	BML –S-252	LAB: Basic Haematology & Clinical Pathology-II	-	-	2	1	50	50	100
10	SEC-9	BML –S-253	LAB: Fundamentals of Biochemistry-II	-	-	2	1	50	50	100
11	SEC-10	BML –S-254	LAB : Fundamentals of Computer	-	-	2	1	50	50	100
12	SEC-11	BML–S-256	LAB: Fundamentals of Microbiology-II	-	-	2	1	50	50	100
Total				**20**	**00**	**12**	**26**	**530**	**670**	**1200**

B.Sc. MLT –Semester III

S. N	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	DSC-7	BML–S- 301	Clinical Haematology-I	3	-	-	3	40	60	100
2	DSC-8	BML–S- 302	Clinical Biochemistry-I	3	-	-	3	40	60	100
3	DSC-9	BML–S- 308	Clinical Microbiology-I	3	-	-	3	40	60	100
4	DSC-10	BML –S- 304	Immunology & Serology-I	2	-	-	2	40	60	100
5	DSC-11	BML–S- 305	Histopathology & Histotechniques –I	3	-	-	3	40	60	100
6	AECC-3	BML –S- 307	Environmental Sciences	4	-	-	4	40	60	100
7	AECC-4	TMUGE301	English Communication-III	2	-	2	3	40	60	100
8	SEC-12	BML–S- 351	LAB: Clinical Haematology-I	-	-	2	1	50	50	100
9	SEC-13	BML –S- 352	LAB: Clinical Biochemistry-I	-	-	2	1	50	50	100
10	SEC-14	BML–S- 358	LAB: Clinical Microbiology-I & Immunology- I	-	-	2	1	50	50	100
11	SEC-15	BML –S- 354	LAB: Histopathology & Histotechniques –I	-	-	2	1	50	50	100
12	SEC-16	BML–S- 355	Clinical Training	-	-	6	3	50	50	100
Total				**20**	**0**	**16**	**28**	**530**	**670**	**1200**

Value Added Course (VAC-1)

1.	VAC-1	TMUGS-301	Managing Self	**2**	**1**	**0**	**0**	**50**	**50**	**100**

B.Sc. MLT –Semester IV

S. N	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	DSC-12	BML–S- 401	Clinical Haematology-II	3		-	3	40	60	100
2	DSC-13	BML–S- 402	Clinical Biochemistry-II	3		-	3	40	60	100
3	DSC-14	BML–S- 408	Clinical Microbiology-II	3		-	3	40	60	100
4	DSC-15	BML–S- 404	Immunology & Serology-II	2		-	2	40	60	100
5	DSC-16	BML –S- 405	Histopathology & Histotechniques –II	2			2	40	60	100
6	CC-6	BML–S- 407	General Pathology	3		-	3	40	60	100
7	AECC-5	TMUGE401	English Communication-IV	2		2	3	40	60	100
8	SEC-17	BML –S- 451	LAB: Clinical Haematology-II	-		2	1	50	50	100
9	SEC-18	BML –S- 452	LAB: Clinical Biochemistry-II	-		2	1	50	50	100
10	SEC-19	BML–S- 458	LAB: Clinical Microbiology-II	-		2	1	50	50	100
11	SEC-20	BML–S- 454	LAB: Immunology & Serology-II	-		2	1	50	50	100
12	SEC-21	BML–S- 455	LAB: Histopathology & Histotechniques –II	-		2	1	50	50	100
13	SEC-22	BML–S- 456	Clinical Training	-		6	3	50	50	100
14		MOOC I		-	-	-	2	-	-	100
Total				**18**	**0**	**18**	**29**	**580**	**720**	**1400**

Value Added Course (VAC-2)

2	VAC-2	TMUGS-401	Managing Work and Others	**2**	**1**	**0**	**0**	**50**	**50**	**100**

B.Sc. MLT -Semester V

S. N	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	DSC-17	BML –S- 501	Immunohematology & Blood Banking	3	-	-	3	40	60	100
2	CC-7	BML –S- 502	Clinical Enzymology & Automation	3	-	-	3	40	60	100
3	DSC-18	BML–S- 507	Medical Microbiology-I	3	-	-	3	40	60	100
4	DSC-19	BML –S- 504	Parasitology	3	-	-	3	40	60	100
5	DSC-20	BML–S- 505	Diagnostic Cytology	3	-		3	40	60	100
6	CSC-1	BML –S- 506	Principles of Laboratory Management	3	-	-	3	40	60	100
7	SEC-23	BML –S- 551	LAB: Immunohematology & Blood Banking	-	-	2	1	50	50	100
8	SEC-24	BML–S- 552	LAB: Clinical Enzymology	-	-	2	1	50	50	100
9	SEC-25	BML –S- 557	LAB: Medical Microbiology-I	-	-	2	1	50	50	100
10	SEC-26	BML–S- 554	LAB: Parasitology	-	-	2	1	50	50	100
11	SEC-27	BML–S- 555	LAB: Diagnostic Cytology-I	-	-	2	1	50	50	100
12	SEC-28	BML–S- 556	Clinical Training	-	-	6	3	50	50	100
13		MOOC II		-	-	-	2	-	-	100
14			Open Elective				3	As Per University Guidelines		
			Total	**18**	**0**	**16**	**31**	**540**	**660**	**1300**

B.Sc. MLT -Semester VI

S. N	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC-8	BML–S- 601	Clinical Endocrinology & Toxicology	3	-	-	3	40	60	100
2	DSC-21	BML–S- 609	Medical Microbiology-II	3	-	-	3	40	60	100
3	DSC-22	BML–S- 605	Clinical Virology	3	-		3	40	60	100
4	CSC-2	BML –S- 606	Biostatistics & Research Methodology	3	-	-	3	40	60	100
5	DSEC	-	Discipline Specific Elective Course	3	-	-	3	40	60	100
6	SEC-29	BML–S- 651	LAB: Clinical Endocrinology & Toxicology	-	-	2	1	50	50	100
7	SEC-30	BML–S- 659	LAB: Medical Microbiology-II	-	-	2	1	50	50	100
8	SEC-31	BML–S- 655	LAB: Clinical Virology	-	-	2	1	50	50	100
9	SEC-32	BML –S- 656	Clinical Training	-	-	6	3	50	50	100
10	DSEC Practical	-	LAB: Discipline Specific Elective Course	-	-	2	1	50	50	100
			Total	**15**	**0**	**14**	**22**	**450**	**550**	**1000**

Note: DSEC courses are to be selected from the list of courses offered.

DISCIPLINE SPECIFIC ELECTIVE COURSES OFFERED (DSEC)

S.No	Code	Course	L	T	P	Credit
		Semester VI (Any One) (including LAB)				
1	BML –S- 607	Advance Diagnostic Techniques	3	0	-	3
2	BML –S- 608	Diagnostic Molecular Biology	3	0	-	3
3	BML–S- 657	LAB: Advance Diagnostic Techniques	-	-	2	1
4	BML–S- 658	LAB: Diagnostic Molecular Biology	-	-	2	1

New Course Added -

Course Code: BML-S-104	Discipline Specific Course -2 (DSC-2) BMLT- Semester-I **Fundamentals ofBiochemistry-I**	L-3 T-0 P-2 C-4
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the role and responsibilities of medical lab technologist	
CO2.	Understanding principle, working and maintenance of various laboratory instruments	
CO3.	Understanding different types of solutions and their preparations	
CO4.	Applying appropriate methods for collection, handling and processing of different body fluids	
CO5.	Analyzing body fluids on the basis of physical, chemical and microscopic examinations	
Course Content:		
Unit-1:	Introduction to Clinical Biochemistry and role of Medical Lab Technologist , ethics, responsibility, safety measure and hazards in clinical biochemistry lab and first aid in laboratory accidents. Glassware's & plastic ware's used in lab, calibration of volumetric apparatus, cleaning& care and maintenance	**8 Hours**
Unit-2:	Principle, working, care & maintenance and calibration of Weighing balance, Hotplate, Magnetic stirrer, Centrifuges, Incubator, Hot air oven, Colorimeter, Spectrophotometer, Water distillation plant, Deionizers Henderson Hassel Balch equation, pH paper, pH meter, method of pH measurement.	**7 Hours**
Unit-3:	Preparation of solution and reagents, normal solution, molar solutions, percent solution, buffer solution, dilutions, w/v, v/v, standard solution, aqueous solutions, concepts of acid and base Units of measurement: SI unit, reference range, conversion factor, units for measurement of bio metabolite, enzymes, protein, drugs, hormones, vitamins	**6 Hours**
Unit-4:	Specimen collection and processing of blood, urine & CSF, separation of serum and plasma, deproteinization of sample, Handling of specimens for testing, preservation of specimen, transport of specimen, factors affecting the clinical results, effect of storage on sample.	**8 Hours**

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New course Added,

Course Code: BML-S-201	Core Course -4(CC-4) BMLT- Semester-II Human Anatomy-II	L-3 T-0 P-0 C-3
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding basic anatomy of different organ and organ system	
CO2.	Understanding endocrine system of body and their functions	
CO3.	Describing the major structures of human body.	
CO4.	Analyze various organ systems and its related disorders	
CO5.	Applying a holistic approach to human health and medical research.	
Course Content:		
Unit-1:	Cardiovascular system: Basic anatomy of heart and important blood vessels Brief introduction about Lymphatic System	8 Hours
Unit-2:	The Nervous System: Basic anatomy of brain and spinal cord, meninges and cerebrospinal fluid, Cranial Nerves	7 Hours
Unit-3:	Endocrine System: Brief anatomy of Pituitary, Thyroid, Parathyroid, Pancreas, Adrenal	6 Hours
Unit-4:	Special Senses: Basic anatomy of eye, ear and nose	8 Hours
Unit-5:	Genitourinary system: Basic anatomy of kidney and associated organs, male reproductive organs, female reproductive organs	7Hours
Text Books:	1. *Textbook of Medical Physiology, Guyton and Hall*	
Reference Books:	1. *Anatomy & Physiology, Ross & Wilson* 2. *Human Anatomy, B D Chaurasia* 3. *Principles of Anatomy and Physiology, Gerard J.Tortora and Bryan H.Derrickson* 4. *https://www.science.gov/topicpages/e/e-learning+human+anatomy* 5. *https://www.digitalteacher.in/human-anatomy*	

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TMU COLLEGE OF PARAMEDICAL SCIENCES VICE PRINCIPAL MORADABAD

New course added.

Course Code: BML-S-202	Core Course -5 (CC-5) BMLT- Semester-II Human Physiology-II	L-3 T-0 P-2 C-4
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the mechanism of action of different organ systems	
CO2.	Understanding electrolytes with respect to alkalosis and acidosis.	
CO3.	Describing reproductive system an sexual characteristics	
CO4.	Analyzing special senses and functions	
CO5.	Evaluating abnormalities and various physical conditions.	
Course Content:		
Unit-1:	Organs of Excretory System: Kidneys, Nephron, Mechanism of Excretion, Urine formation (Glomerular filtration and Tubular reabsorption) , Electrolytes: their balances and imbalances Introduction of acidosis and alkalosis	8 Hours
Unit-2:	Muscle nerve physiology, types of muscles, their gross structural and functional difference with reference to properties	7 Hours
Unit-3:	Nervous system- general organization of CNS, function of important structure and spinal cord, neuron, nerve impulse, type of nerves according to function, Autonomic nervous system- organization & function Special senses-general organization & functions	6 Hours
Unit-4:	Endocrine System: Brief introduction about endocrine glands and their secretion, common endocrinological disorder such as diabetes mellitus, hyper & hypothyroidism, dwarfism, gigantism, tetany.	8 Hours
Unit-5:	Reproductive System: male & female reproductive organs, sex hormones, secondary sexual characteristics, puberty, spermatogenesis, oogenesis, menstrual cycle, pregnancy, menopause, contraceptive measures.	7Hours
Text Books:	*1. Textbook of Medical Physiology, Guyton and Hall*	
Reference Books:	*1. Anatomy & Physiology, Ross & Wilson* *2. Human Anatomy, B D Chaurasia* *3. Principles of Anatomy and Physiology, GerardJ. Tortora and Bryan H.Derrickson* *4. http://www.rapidlearningcenter.com/biology/human-physiology/human-physiology.html* *5. https://www.adinstruments.com/lt/human-physiology*	

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TMU COLLEGE OF PARAMEDICAL SCIENCES MORADABAD PRINCIPAL

New Course Added

Course Code: BML-S-204	Discipline Specific Course -5 (DSC-5) BMLT- Semester-II **Fundamentals of Biochemistry-II**	L-3 T-0 P-2 C-4
Course Outcomes:	**On completion of the course, the students will be :**	
CO1	Understanding the concepts and theories of biomolecules	
CO2.	Understanding the chemistry of carbohydrates, proteins, lipids and amino acids.	
CO3.	Describing the mechanism of enzyme action and identify the classes and factors affecting action	
CO4.	Analyzing different diseases associated with abnormalities of biomolecules	
CO5.	Evaluating the biochemical test results.	
Course Content:		
Unit-1:	Chemistry of Carbohydrates: Classification, function, importance, structure, digestion & absorption, test of carbohydrates	**8 Hours**
Unit-2:	Amino Acids & Proteins: Classification, Structure, peptides and polypeptides, Properties ,Biological functions, digestion and absorption, test of proteins	**7 Hours**
Unit-3:	Enzymes: Definition, properties Classification of enzyme, Cofactor & Coenzymes, general mode of action of enzymes, units for measuring enzyme activity, factors affecting enzyme activity, factor responsible for abnormal enzyme secretion Nucleic acids: Structure, Function and types of DNA and RNA, Nucleotides, Nucleosides, Nitrogen bases	**6 Hours**
Unit-4:	Chemistry of lipids: Introduction, definition, classification, biomedical importance, digestion and absorption. Fatty acids: Essential and non-essential fatty acids, saturated and unsaturated fatty acids, naming of fatty acids. Brief introduction of lipoproteins, Biological membrane	**8 Hours**
Unit-5:	Vitamins: classification, function and disease associated with vitamins. Minerals and ions: Micro and macro minerals, requirement, function and biological importance of Calcium, Iron, Iodine, Zinc, Phosphorus, Copper, Sodium and Potassium	**7Hours**
Text Books:	***1. Text book of Biochemistry, D M Vasudevan,Jaypee Publishers***	
Reference Books:	***Practical Biochemistry, Singh & Sahni*** ***Biochemistry, Voet & Voet, 4th edition, John Wiley & sons*** ***https://www.sciencedirect.com/book/9780702051401/clinical-biochemistry-metabolic-and-clinical-aspects***	

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New Course Added

Note: Course Outcomes of following practical's are covered in their respective theory cours[3,4]es

Course Code: **BML-S-251**	**Skill Enhancement Course -7 (SEC-7)** **BMLT- Semester-II** LAB: **Human Physiology-II**	**P-2** **C-1**
Course Content:		
1.	To perform total platelet count.	
2.	To perform bleeding time.	
3.	To perform clotting time.	
4.	To study about CSF examination.	
5.	To study about intrauterine contraceptive devices.	
6.	To demonstrate microscopic structure of bones with permanent slides.	
7.	To demonstrate microscopic structure of muscles with permanent slides.	

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New Course Added

Course Code: BML-S-253	Skill Enhancement Course -9 (SEC-9) BMLT- Semester-II LAB: Fundamentals of Biochemistry-II	P-2 C-1
Course Content:		
1.	To identify carbohydrates in given solution by various methods.	
2.	To determine protein by Biuret method.	
3.	To perform protein test by various methods.	
4.	Physical examination of urine	
5.	Urine sugar determination by Benedict'smetod.	
6.	Protein by heat and acetic method	
7.	Bile salt, Bile pigments and Urobilinogen determination	
8.	Determination of Ketone bodies	
9.	Determination of various parameters of urine by uristik method.	
10.	Preparation of hemolysate	

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New Course Added

Course Code: BML-S- 353	Skill Enhancement Course -14 (SEC-14) BMLT-Semester-III LAB :Clinical Microbiology –I & Immunology-I	P-2 C-1
1.	Preparation of culture media- Nutrient agar, Macconkey agar, Blood agar media and Chocolate agar	
2.	Inoculation of different culture methods- Streaking method and Spreading method	
3.	Isolation of pure cultures	
4.	Cultivation of anaerobic bacteria	
5.	Antibiotic sensitivity test	
6.	Processing of culture growth for biochemical tests and identification of microorganisms.	
7.	Biochemical tests for species identification	
8.	To perform RA test	
9.	To perform WIDAL test	
10.	To perform RPR test.	
11.	To perform CRP test	

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New Course Added -

Course Code: BML-S-307	Ability Enhancement Core Course (AECC-3) BMLT- Semester-III Environmental Sciences	L-4 T-0 P-0 C-4
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding basic concepts in the context of ecological and environmental sciences.	
CO2.	Understanding and describing biodiversity and also summarize bio geographical distribution of India.	
CO3.	Describing concepts and methods to apply in environmental communication and public awareness.	
CO4.	Applying the ethical and cultural conduct in environmental activities.	
CO5.	Analyzing the ideas about energy resources in today's scenario and discussing about alternate energy sources.	
Course Content:		
Unit-1:	Definition and Scope of environmental studies, multidisciplinary nature of environmental studies, Concept of sustainability & sustainable development. **Ecology and Environment**: Concept of an Ecosystem-its structure and functions, Energy Flow in an Ecosystem, Food Chain, Food Web, Ecological Pyramid& Ecological succession, Study of following ecosystems: Forest Ecosystem, Grass land Ecosystem & Aquatic Ecosystem & Desert Ecosystem.	**10Hours**
Unit-2:	**Natural Resources:** Renewable & Non-Renewable resources; Land resources and land use change; Land degradation, Soil erosion & desertification. **Deforestation**: Causes & impacts due to mining, Dam building on forest biodiversity & tribal population. **Energy Resources**: Renewable & Non-Renewable resources, Energy scenario & use of alternate energy sources, Casestudies. **Biodiversity:** Hot Spots of Biodiversity in India and World, Conservation, Importance and Factors Responsible for Loss of Biodiversity, Biogeographical Classification of India	**10 Hours**
Unit-3:	**Environmental Pollutions:** Types, Causes, Effects & control; Air, Water, soil & noise pollution, Nuclear hazards & human health risks, Solid waste Management; Control measures of urban & industrial wastes, pollution case	**10Hours**

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	Studies	
Unit-4:	**Environmental policies & practices: Climate change & Global** Warming (Green house Effect),Ozone Layer -Its Depletion and Control Measures, Photochemical Smog, Acid Rain Environmental laws: Environment protection Act; air prevention & control of pollution act, Water Prevention & Control of Pollution Act, Wild Life Protection Act, Forest Conservation Acts, International Acts; Montreal & Kyoto Protocols & Convention on biological diversity, Nature reserves, tribal population & Rights & human wild life conflicts in Indiancontext	**9 Hours**
Unit-5:	**Human Communities & Environment:** Human population growth; impacts on environment, human health & welfare, Resettlement & rehabilitation of projects affected person: A case study, Disaster Management; Earthquake, Floods & Droughts, Cyclones & Landslides, Environmental Movements; Chipko, Silent Valley, Vishnoi's of Rajasthan, Environmental Ethics; Role of Indian & other regions & culture in environmental conservation, Environmental communication & public awareness; Case studies.	**9Hours**
Text Books:	*1. "Environmental Chemistry", De, A. K., New AgePublishersPvt.Ltd.*	
Reference Books:	*1. "BiodiversityandConservation",Bryant, P. J.,HypertextBook* *2. "Textbook of Environment Studies",Tewari, Khulbe&Tewari,I.K.Publication* *3. http://odl.teriuniversity.ac.in/course/category.php?id=3* *4. https://www.edx.org/learn/environmental-science*	

New Course Added

Course Code: BML-S- 404	Discipline Specific Course -15(DSC-15) BMLT- Semester-IV Immunology & Serology-II	L-2 T-0 P-2 C-3
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding immunological disorders and their significance	
CO2.	Understanding various auto immune disorders and their markers	
CO3.	Applying scientific approach and technique to the serological sample for investigating the antigen, antibody and tumor markers	
CO4.	Analyzing the compatibility of tissue for transplantation, antigen antibody detection in sample to diagnose any immunological or autoimmune disorders using various techniques.	
CO5.	Evaluating serum sample for any immunological disorders.	
Course Content:		
Unit-1:	Western blotting, Immunodiffusion, Immunoelectrophoresis, Hypersensitivity and its types Introduction to Allergy and its laboratory test	5 Hours
Unit-2:	Introduction of transplant immunology, graft rejection, tissue typing for kidney and bone marrow transplant, Laboratory test for transplant.	5 Hours
Unit-3:	Autoimmune disorders, pathogenesis, organ specific and systemic autoimmune disorders and its markers such parietal cell antibody, anti sperm antibody, lupus anticoagulants, anti mitochondrial antibody, ANA, ds DNA, HLA-B27, ASMA, anti CCP	5Hours
Unit-4:	Immunological disorders: primary and secondary immunodeficiency, SCID, AIDS, Tumor, types of tumors, Various tumor Markers, their significance and method of estimation.	5Hours
Unit-5:	Vaccines, classification and applications, Active and passive immunization, Immunoprophylaxis schedule in neonates, children and in	4Hours

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New Course Added

Course Code: BML-S-502	Core Course -7(CC-7) BMLT- Semester-V Clinical Enzymology & Automation	L-3 T-0 P-2 C-4
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Describing concepts and theories of enzymes	
CO2.	Understanding Enzyme kinetics, physiological significances and enzyme Inhibition.	
CO3	Applying Automation, principle, working and maintenance of various clinical chemistry analysers, point of care testing	
CO4.	Analysing enzyme activity, factors affecting enzyme level in serum/ plasma.	
CO5.	Evaluating enzyme concentration in different samples	
Course Content:		
Unit-1:	Introduction to enzymes, Classification of Enzymes, Isoenzymes, Concept of lock and key and induced fit theory, concept of activation energy and binding energy. Factors affecting enzyme activity	6 Hours
Unit-2:	Coenzyme: Classification, various types and function, structure of NAD+, NADP+, FAD and FMN, PPP Units for measuring enzyme activity, factors affecting enzyme level in serum/ plasma. Clinical assay & its type, kinetic assay and end point assay for the enzymes	7 Hours
Unit-3:	Enzyme kinetics, the Michaelis-Menten equation and its physiological significances, Enzyme Inhibition, types of inhibitors of enzyme	8 Hours
Unit-4:	Isoenzymes, their tissue distribution and clinical significance: ALT, AST, ALP, GGT, CPK, CK-MB, LDH,Troponin, Myoglobin, Amylase, Lipase, ACP.	8 Hours
Unit-5:	Basic Concepts of Automation, principle, working and maintenance of various clinical chemistry analyzers, point of care testing, Hospital Laboratory Management, Introduction of HIS and LIS.	7 Hours
Text Books:	1. *Text book of Biochemistry, D M Vasudevan,Jaypee Publishers* 2. *Text book of Biochemistry, M N Chatterjea, Rana Shinde*	
Reference Books:	1. *Biochemistry, Voet & Voet, 4th edition, John Wiley & sons* 2. *Biochemistry, U Satyanarayan* 1. *https://onlinecourses.swayam2.ac.in/cec20_bt20/preview* 2. *https://portlandpress.com/essaysbiochem/article/doi/10.1042/bse0590001/88345/Enzymes-principles-and-biotechnological*	

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New Course Added

Course Code: BML-S-506	Compulsory Specified Course -1 (CSC -1) BMLT- Semester-V Principles of Laboratory Management	L-3 T-0 P-0 C-3
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding ethical principles and accreditation for clinical laboratories	
CO2.	Applying all general & clinical safety measures to reduce the risk of infection.	
CO3.	Applying methods for interpretation and release of examination results for quality assurance	
CO4.	Evaluating the validating, instrument calibration & importance of medical audit (NABL) to enhance the quality of laboratory.	
CO5.	Creating pre & post exposure guidelines of some infectious diseases	
Course Content:		
Unit-1:	Ethical Principles and standards for a clinical laboratory professional duty to the patient, duty to colleagues and other professionals, Good Laboratory Practice (GLP) ,Introduction to Basics of GLP and Accreditation, Aims of GLP and Accreditation, Advantages of Accreditation, Brief knowledge about National and International Agencies for clinical laboratory accreditation	**7 Hours**
Unit-2:	Awareness/Safety in a clinical laboratory, General safety precautions. HIV: pre- and post-exposure guidelines, Hepatitis B & C: pre- and post-exposure guidelines, Drug Resistant Tuberculosis Patient management for clinical samples collection, transportation and preservation, Sample accountability, Purpose of accountability, Methods of accountability	**6 Hours**
Unit-3:	Sample analysis: Introduction, factors affecting sample analysis, reporting results, basic format of a test report, reported reference range, clinical alerts, abnormal results, results from referral laboratories, release of examination results, alteration in reports	**6 Hours**
Unit-4:	Quality Management system: Introduction, Quality assurance, Quality control system, Internal and External quality control, quality control chart Biomedical Introduction and importance of calibration and Validation of Clinical Laboratory instrument Ethics in Medical laboratory Practice, Ethics in relation to Pre-Examination procedures, Examination procedures, reporting of results, preserving medical records Procurement of equipment and Inventory Control,	**6 Hours**
Unit-5:	Audit in a Medical Laboratory, Introduction and Importance, NABL & CAP, Responsibility, Planning, Horizontal, Vertical and Test audit, Frequency of audit, Documentation	**6 Hours**

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New course Added

Course Code: BML-S- 552	Skill Enhancement Course -24 (SEC-24) BMLT- Semester-V LAB: Clinical Enzymology & Automation	P-2 C-1
	1. To perform enzyme estimation of LFT 2. To perform enzyme estimation of Cardiac profile 3. Determination of Troponin I 4. To perform enzyme estimation of Pancreatic disorder 5. To perform estimation of ACP. 6. Antenatal profile 7. Estimation of bicarbonate 8. Arterial blood gas analysis 9. Determination of Calcium 10. Creatinine and urea clearance test	

New Course Added

Course Code: BML-S-601	Core Course -8 (CC-8) BMLT- Semester-VI Clinical Endocrinology &Toxicology	L-3 T-0 P-2 C-4
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the secretion, function & regulation of hormones.	
CO2	Understanding about drug abuse and all investigation for drug screening	
CO3.	Analyzing thyroid function test and disorder associated with its dysfunctions	
CO4.	Analyzing infertility profile with its hyper and hypo secretions	
CO5.	Evaluating the toxic effect of alcohol, lead, zinc & mercury in the human body.	
Course Content:		
Unit-1:	Hormones, Classification of hormones, organs of endocrine system their secretion and function, regulation of hormone secretion, Mechanism of action	6 Hours
Unit-2:	Thyroid function test: Thyroid hormones, biologicalfunction, hypothyroidism, hyperthyroidism, Determination of T_3, T_4, TSH, FT_3, FT_4, TBG, Disorder associated with thyroiddysfunction.	8 Hours
Unit-3:	Infertility profile: LH, FSH, TSH, Estrogen, Progesterone,Total Testosterone, Free testosterone,DHEA-S, 17- Ketosteroids, Prolactin, their estimation and clinical significance, reference range, hypo and hyper secretion, Triple Test	8 Hours
Unit-4:	Growth hormone, ACTH, Aldosterone, Cortisol their estimation and clinical significance, reference range, hypo and hyper secretion	7 Hours
Unit-5:	Introduction of Toxicology, Alcohol poisoning, Lead poisoning, Zinc poisoning, Mercury poisoning drugs abuse, screening procedure for drug screening, Spot tests, hair and urine test, Immunoassay for drugs.	7 Hours
Text Books:	1. *Text book of Biochemistry, D M Vasudevan, Jaypee Publishers* 2. *Text book of Biochemistry, M N Chatterjea, Rana Shinde*	
Reference Books:	1. *Clinical Chemistry, Bishop* 2. *https://www.endotext.org/* 3. *https://uscmed.sc.libguides.com/c.php?g=377955&p=2558549*	

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New course Added

Course Code: BML-S-607 / BML-S-602	Discipline Specific Elective Course (DSEC) BMLT- Semester - VI Advance Diagnostic Techniques	L-3 T-0 P-2 C-4
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the concept of immunoassay and their applications in clinical diagnosis	
CO2.	Describing radioisotopes , instruments for measurement and applications in clinical biochemistry	
CO3.	Applying chromatographic techniques to different biological samples	
CO4.	Analyzing different centrifugation techniques and their significance	
CO5.	Analyzing biomolecules on the basis of electrophoresis and its applications in clinical diagnosis	
Course Content:		
Unit-1:	Chromatography; principle, types and applications. Paper Chromatography, Thin layer chromatography, High performance **liquid chromatography** (HPLC), Gas liquid chromatography, Ion exchange chromatography and their application in diagnosis.	**7 Hours**
Unit-2:	Basic Principle of electrophoresis, Paper electrophoresis, Ge electrophoresis, PAGE, sodium dodecyl sulfate polyacrylamide gel electrophoresis (**SDS-PAGE**), Agarose ge electrophoresis, buffer systems in electrophoresis. Electrophoresis of proteins and nucleic acids, hemoglobin, immunoglobulin's, isoenzymes Applications of electrophoresis in clinical diagnosis.	**8 Hours**
Unit-3:	Centrifugation, fixed angle and swinging bucket rotors, Relative centrifugal force(RCF) and Sedimentation coefficient, differential centrifugation, density gradient centrifugation and Ultra centrifugation.	**6 Hours**
Unit-4:	Radioisotopes, Radioactivity, instruments for radioactivity measurement, applications of radioisotopes in clinical biochemistry	**7 Hours**
Unit-5:	Immunoassay: Enzyme-linked immunoassay (ELISA), Radioimmunoassay (RIA), fluorescent immunoassay (FIA), fluorescence-activated cell sorting (**FACS**), and their applications in clinical diagnosis. Nano biosensors: concept and applications	**8Hours**
Text Books:	1. ***Text book of Biochemistry, D M Vasudevan, Jaypee Publishers*** 2. ***Text book of Biochemistry, M N Chatterjea, Rana Shinde***	
Reference Books:	1. ***Clinical Chemistry, Bishop*** 2. ***https://cmr.asm.org/content/20/3/511/figures-only*** 3. ***https://www.health.harvard.edu/diagnostic-tests-and-medical-procedures***	

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New course Added

Course Code: BML-S-608 / BML-S-603	Discipline Specific Elective Course (DSEC) BMLT- Semester-VI Diagnostic MolecularBiology	L-3 T-0 P-2 C-4
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Describing nucleic acids, and their synthesis	
CO2.	Understanding the process of protein synthesis	
CO3.	Understanding the PCR, RT PCR, reverse transcriptase PCR & Nested PCR.	
CO4.	Applying the techniques of Flow cytometry, stem cell banking, Prenatal Diagnosis by Diagnostic Molecular Biology.	
CO5.	Analyzing DNA, RNA, Protein and chromosomes by Blotting techniques and Karyotyping.	
CO6.	Analyzing blood volume, red cell volume and plasma volume, red cell life span, platelet life span by Radioisotopes.	
Course Content:		
Unit-1:	Deoxyribonucleic Acid (DNA) Replication: Replication, DNA Damage (Types and agent of mutation) Repair mechanisms	**7 Hours**
Unit-2:	Transcription: Introduction of Transcription & Stage of Transcription Translation: Introduction of Translation & Steps of Translation	**7 Hours**
Unit-3:	Nucleic acid amplification testing, **Polymerase chain reaction** (PCR Principle, Types, applications, Chromatography, its principle, types and applications. Basic Principle of electrophoresis, Paper electrophoresis, Gel electrophoresis, PAGE, sodium dodecyl sulfate polyacrylamide gel electrophoresis (**SDS-PAGE**), Agarose ge electrophoresis, buffer systems in electrophoresis. Applications o electrophoresis in clinical diagnosis.	**6 Hours**
Unit-4:	Blotting techniques, southern blotting and Western blotting Introduction to chromosomes, its structure and disorder, Karyotyping, Fluorescence in situ hybridization (**FISH**) . Immunoassay:**Radioimmunoassay**(RIA),Enzyme-linked immunoassay (ELISA), fluorescent immunoassay(FIA), and their applications in clinical diagnosis.	**8 Hours**
Unit-5:	Radioisotopes and its application in measurement of blood volume, determination of red cell volume and plasma volume, red cell life span, platelet life span, radiation hazards and its prevention disposal o radioactive material Introduction and applications of Flow cytometry, Fluorescence-activated cell sorting (**FACS**), Stem cell banking, Prenatal Diagnosis	**8 Hours**
Text Books:	***1. Text book of Biochemistry, D M Vasudevan, Jaypee Publishers***	

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New Course Added.

Course Code: BML-S-606	Compulsory Specified Course -2 (CSC -2) MLT- Semester- VI Biostatics & ResearchMethodology	L-3 T-0 P-0 C-3
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding research methodology and basic statistical concepts	
CO2.	Applying perspectives for training development related to organisational setups	
CO3.	Applying statistical methods for representation of data	
CO4.	Analyzing data on the basis of different statistical methods	
	Evaluating data on the basis of statistical analysis	
CO5.	Evaluating quality management system in diagnostic laboratory	
Course Content:		
Unit-1:	Research Methodology – Definition of research, Characteristics of research, Steps involved in research process, Types of Research methods and methodology, Terminology used in quality control such as sensitivity, specificity, accuracy, precision, positive and negative predictive value.	**6 Hours**
Unit-2:	Statistics, data, population, samples, parameters; Representation of Data: Tabular, Graphical, Measures of central tendency, Arithmetic mean, mode, median; Measures of dispersion, Range, mean deviation, variation, standard deviation, Standard error, Chi-square test	**6 Hours**
Unit-3:	Introduction and significance of Student's t-distribution: test for single mean, difference of means and paired t- test, F-distribution, one-way and two-way analysis of variance (ANOVA). Small sample test based on t-test, Z- test and F test; Confidence Interval; Distribution-free test	**7 Hours**
Unit-4:	Global Perspective in the field of Clinical Laboratory Science, Development, Training, Types of Laboratory, Concept of Lab Design, Organizational Set up of NABL, CAP	**6 Hours**
Unit-5:	Total Quality Management System General Requirements for Standardization & Calibration of Clinical Laboratories: Introduction, Scope & Need of standardization, Quality Management requirement: testing & Calibration Procedures, Total Quality Assurance, Quality Control Charts & Systems. Quality Audit: Internal & External Audit, Accreditation & Certification NABL, ISO, CAP	**7 Hours**

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New Course Added

Note: Course Outcomes of following practical's are covered in their respective theory courses

Course Code: BML-S- 651	**Skill Enhancement Course -29 (SEC-29)** BMLT- Semester-VI **LAB :Clinical Endocrinology & Toxicology**	**P-2 C-1**
	1. To determine T_3 conc. in serumsample. 2. To determine T_4 conc. in serumsample. 3. To determine TSH conc. in serum sample. 4. To determine LH conc. in serum sample. 5. To determine FSH conc. in serum sample. 6. To determine Prolactin conc. in serum sample. 7. To determine TSH conc. in serum sample. 8. To perform TRIPLE test. 9. Demonstration of male and female infertility test. 10. Beta HCG	

New course Added.

Course Code: BML-S- 657 BML-S-652	Discipline Specific Elective Course (DSEC) BMLT- Semester-VI LAB: Advance Diagnostic Techniques	P-2 C-1
	1. To perform separation of amino acids by paper chromatography 2. To perform separation of amino acids by thin layer chromatography 3. To perform separation of DNA by Agarose gel electrophoresis. 4. Separation of protein by PAGE 5. Separation of protein by paper electrophoresis 6. Separation of haemoglobin 1.	

New Course Added

Course Code: BML-S- 658 BML-S-658	Discipline Specific Elective Course (DSEC) BMLT- Semester-VI LAB: Diagnostic Molecular Biology	P-2 C-1
	1. Isolation of DNA 2. Separation of DNA by Agarose gel electrophoresis 3. Demonstration of PCR. 4. HIV test by Western Blotting 5. To perform karyotyping 6. Demonstration of PCR mycobacterium pathogen 7. Demonstration of PCR HIV 8. Separation of Nucleic acid	

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Post Revision

Course Code: BML-S-304	Discipline Specific Course -10(DSC-10) BMLT- Semester-III Immunology & Serology-I	L-2 T-0 P-0 C-2
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the basic concepts of immunology and immune response mechanism.	
CO2.	Understanding the discoveries and innovation done by various scientist in field of immunology & serology and about antigen antibody.	
CO3.	Applying scientific approach and technique to the serological sample for investigating the antigen or antibody.	
CO4.	Applying various technique like ELISA, RIA to the samples for the diagnostic report.	
CO5.	Evaluating normal & abnormal reports by antigen antibody detection using various techniques.	
Course Content:		
Unit-1:	Historical background, general concepts of the immune system, innate and adaptive immunity; active and passive immunity, primary and secondary immune response. Cell and organs of immune system, Phagocytosis	5Hours
Unit-2:	Antigens and haptens: Properties, foreignness, molecular size, heterogeneity, B and T cell Epitopes, T dependent and T independent antigens. Antibodies: structure, function and properties of the antibodies, different classes, subclasses and biological activities of antibodies, concepts of antibody diversity, isotype, allotype, Introduction of hybridoma technology, monoclonal antibodies, polyclonal antibody	5Hours
Unit-3:	Mechanism of humoral and cell mediated immune response. Introduction of Major Histocompatibility Complex, organization of MHC and inheritance in humans, Antigen presenting cells, antigen processing and presentation Complement system and complement fixation test.	5Hours
Unit-4:	Laboratory tests for demonstration of antigen – antibody reaction such as agglutination, precipitation, precipitation	5Hours

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	in gels, ELISA, RIA, Immunofluorescence assay, WIDAL, ASO, CRP, RA, RPR, TPHA	
Unit-5:	Rheumatological diseases, etiology and pathogenesis and lab investigations	**4Hours**
Text Books:	1. *Abbas AK, Lichtman AH, Pillai S. (2007). Cellular and Molecular Immunology. 6th edition Saunders Publication,Philadelphia.*	
Reference Books:	1. *Murphy K, Travers P, Walport M. (2008). Janeway'sImmunobiology. 7theditionGarland Science Publishers, NewYork.* 2. *PeakmanM, and Vergani D.(2009).Basic and Clinical Immunology. 2nd edition Churchill Livingstone Publishers,Edinberg.* 3. *Richard C and Geiffrey S. (2009). Immunology. 6th edition. Wiley BlackwellPublication* *https://teachmemedicine.org/immunology-course-content/* *http://www.cukashmir.ac.in/whats-new/e-Content-for-various-Programmes-offered-by-the-University.aspx*	3

Pre Revision

B.Sc. MLT- III Semester (II Year)

Course/Paper: Immunology & Serology -I

L	T	P	C
2	0	0	2

Paper Code: BML-S-304

Learning Objective: This course has been formulated to impart basic aspects of immunity, antigens, antibodies, various serological reactions, techniques and their utility in laboratory diagnosis of human diseases.

Unit-I

Historical background, general concepts of the immune system, innate and adaptive immunity; active and passive immunity; primary and secondary immune response.

Cell and organs of immune system, Phagocytosis

Unit-II

Antigens and haptens : Properties ,foreignness, molecular size, heterogeneity, B and T cell epitopes; T dependent and T independent antigens.

Antibodies: Historical perspective of antibody structure; structure, function and properties of the antibodies; different classes, subclasses and biological activities of antibodies; concepts of antibody diversity, isotype, allotype, Introduction of hybridoma technology, monoclonal antibodies, polyclonal antibody

Unit-III

Mechanism of humoral and cell mediated immune response.

Introduction of Major Histocompatibility Complex, organization of MHC and inheritance in humans; Antigen presenting cells, antigen processing and presentation

Complement system and complement fixation test.

Unit-IV

Laboratory tests for demonstration of antigen – antibody reaction such as agglutination, precipitation, ELISA, RIA, Immunofluorescence,

Unit-V

Rheumatological diseases, etiology and pathogenesis and lab investigations

Learning Outcome: The students will learn scientific approaches/techniques that are used to investigate various diseases.

Suggested Readings:

1. *Abbas AK, Lichtman AH, Pillai S. (2007). Cellular and Molecular Immunology. 6th edition Saunders Publication, Philadelphia.*
2. *Delves P, Martin S, Burton D, Roitt IM. (2006). Roitt's Essential Immunology.11th edition Wiley-Blackwell Scientific Publication, Oxford.*
3. *Goldsby RA, Kindt TJ, Osborne BA. (2007). Kuby's Immunology. 6th edition W.H. Freeman and Company, New York.*
4. *Murphy K, Travers P, Walport M. (2008). Janeway's Immunobiology. 7th edition Garland Science Publishers, New York.*
5. *Peakman M, and Vergani D. (2009). Basic and Clinical Immunology. 2nd edition Churchill Livingstone Publishers, Edinberg.*
6. *Richard C and Geiffrey S. (2009). Immunology. 6th edition. Wiley Blackwell Publication.*

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