



**UNIVERSITY POLYTECHNIC
BIRLA INSTITUTE OF TECHNOLOGY
MESRA, RANCHI**



**SYLLABUS 1ST YEAR (1ST & 2ND SEMESTER)
B.Sc. in MEDICAL LAB TECHNOLOGY
AS PER CBCS
UNIVERSITY POLYTECHNIC BIT, MESRA
2023**

Course Structure
BMLT
Syllabus as per CBCS System

THREE WEEKS INDUCTION PROGRAM

Including UNIVERSAL HUMAN VALUE (UHV-I)

First Semester						
Course No	Subject	Segment	L	T	P	Credit
BMT 101	Human Anatomy & Physiology –I	CC	3	1	0	4
BMT 103	Chemistry for MLT	BS	3	0	0	3
BMT 105	Basics of Electrical & Electronics	ES	3	0	0	3
BMT 107	Laboratory Mathematics	BS	3	0	0	3
BMT 109	Communication and Professional Skill	HS	3	0	0	3
BMT 102	Human Anatomy & Physiology Lab.-I	CC	0	0	3	1.5
BMT 104	Chemistry for MLT Lab.	BS	0	0	2	1
BMT 106	Basics of Electrical & Electronics Lab	ES	0	0	2	1
BHS 108/110/112/114	Sports & Yoga/NSS/NCC/CA	HS	0	0	2	1
BMT 116	Basic Workshop I (Health care)	CC	0	0	3	1.5
Periods per week			15	1	12	-
Total Credit			-	-	-	22
Total periods per week			-	-	-	28

Where; L= Lecture, T= Tutorial and P= Practical

**Course Structure
BMLT**

Second Semester						
Course No	Subject	Segment	L	T	P	Credit
BMT 201	Human Anatomy & Physiology – II	CC	3	0	0	3
BMT 203	Hematology – I	CC	3	0	0	3
BMT 205	Clinical Chemistry- I	CC	3	0	0	3
BMT 207	IT SKILLS	ES	3	0	0	3
BMT 209	Histology	CC	3	0	0	3
BMT 202	Human Anatomy & Physiology Lab.-II	CC	0	0	2	1
BMT 204	Hematology Lab.-I	CC	0	0	2	1
BMT 206	Clinical Chemistry Lab-I	CC	0	0	2	1
BMT 208	IT Lab.	ES	0	0	2	1
BMT 210	Essentials of Environmental Science	AUDIT	2	0	0	Non-Credit
BHS 210/212/214/216	Sports & Yoga /NSS/NCC/CA	HS	0	0	2	1
BMT 218	Basic Workshop II (Health care)	CC	0	0	2	1
Periods per week			17	00	12	-
Total Credit			-	-	-	21
Total periods per week			-	-	-	29

Where; L= Lecture, T= Tutorial and P= Practical

First Semester

BMLT SYLLABUS

HUMAN ANATOMY AND PHYSIOLOGY- I

PROGRAMME: B. Sc. Medical Lab Technology							
COURSE CODE: BMT 101			COURSE TITLE: HUMAN ANATOMY AND PHYSIOLOGY- I				
COMPULSORY / OPTIONAL: COMPULSORY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDITS	PE	FINAL	TOTAL
3	1		4	4	Q-20, TA-5, MID-25	50	100

L= Lecture, T= Tutorial and P= Practical, Q= Quiz, TA= Teacher Assessment, MID= Mid Semester Exam

RATIONALE: To provide the basic knowledge of Human Anatomy and Physiology and its application to understand the actual concepts and the medical challenges in the health care system.

COURSE OUTCOMES

CO1	To understand the basics of Anatomy and physiology and there functions.
CO2	The students may understand the contributions of anatomical system, structure of skeleton system and its applications.
CO3	The students may understand about the body fluids and there classifications morphology, functions and related terms to explain the medical uses.
CO4	The students may understand about the anatomy of respiratory, digestive and liver and there functions that help for medical technology.
CO5	The students may understand about the human circulatory system and concepts of blood circulation and challenges of abnormalities.

(CO= Course outcome Module wise)

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	TITLE: The anatomic and physiological organization of human body 1.1 Definition of cell and its types, tissues, organs and related terms 1.2 Structure of cells and its organelles 1.3 Anatomy and its classifications and related terms

	<p>1.4 Structural organization of the human body 1.5 Characteristics of human living beings</p> <p>Course Outcome: CO1 Teaching Hours : 8 hrs</p>
2	<p>TITLE: Skeletal system, bones, joint and muscle</p> <p>1.1 Definition of skeleton system 1.2 Types of bones, structure, growth of bones and its function 1.3 Division of Skeleton system- Appendicular & Axial 1.4 Name of major bones and their parts 1.5 Joints and its classifications & Muscles and their functions</p> <p>Course Outcome: CO2 Teaching Hours : 8 hrs</p>
3	<p>TITLE: The body fluids, blood morphology, chemistry and their function</p> <p>1.1 Definition of blood, properties and its function 1.2 Classification of blood, morphology and chemistry of RBC, WBC and Platelets 1.3 Blood grouping system- ABO, Rh factors and other types 1.4 Role of body fluids, coagulant & anti-coagulants and clotting factors 1.5 Hemopoiesis and related terms</p> <p>Course Outcome: CO3 Teaching Hours : 8 hrs</p>
4	<p>TITLE: The Respiratory system, digestive system, structure of liver and their function</p> <p>1.1 Introduction of respiratory system and organs involved 1.2 Anatomical studies of respiratory system and their functions 1.3 Introduction of digestive system and organs involved 1.4 Anatomical studies of digestive system and their functions 1.5 Anatomical structure of liver and their functions</p> <p>Course Outcome: CO4 Teaching Hours : 8 hrs</p>
5	<p>TITLE: Cardiovascular system and its functions</p> <p>1.1 Introduction of human heart, position, chambers and its size 1.2 Anatomy structure of human heart, flow of circulations and their functions 1.3 Role of cardiac cycle, heart rate, cardiac output and related terms</p> <p>1.4 Measurement of pulse, blood pressure and auscultation for heart sounds</p> <p>1.5 Cardiovascular system related abnormalities</p> <p>Course Outcome: CO5 Teaching Hours : 8 hrs</p>

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication
1	Best and Taylor's Physiological Basis of Medical Practice	Best & Taylor's: William & Wilkins, Baltimore

2	Human Anatomy – Regional & Applied	Chaurasia; Part I, II, III, CBS Publishers & Distributors, New Delhi
3	Human Physiology	C.C. Chatterjee; Vols. I & II, Medical Allied Agency, Calcutta
4	Textbook of Medical Physiology	Guyton & Hall; WB Saunders Company
5	Exercise Physiology Laboratory Manual	Adams, Gene; W.C.B. McGraw Hill, New York: 1998

E-REFERENCES:

1. Website url: <https://www.medicalnewstoday.com/articles/320444>
2. <https://www.wikipedia.org/>
3. <https://microbiologyinfo.com/>
4. <https://www.medicalnewstoday.com/articles/315133>

CHEMISTRY FOR MLT

PROGRAMME: B.Sc. Medical Laboratory Technology							
COURSE CODE: BMT 103			COURSE TITLE: Chemistry for MLT				
COMPULSORY / OPTIONAL: COMPULSORY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEEK	CREDIT	PE	FINAL	TOTAL
3	-	-	3	3	Q-20, TA-5, MID-25	50	100

L= Lecture, T= Tutorial and P= Practical, Q= Quiz, TA= Teacher Assesment, MID= Mid Semester Exam

RATIONALE: The students may have better knowledge of chemistry, especially regarding the applications of the subject in the various fields of medical and allied industries.

COURSE OUTCOMES By studying these topics, the students will be able to understand:

CO1	The fundamental knowledge of measurement, chemical calculation & solutions
CO2	Learn about the properties of various elements and different types of bonding for understanding it's application in paramedical domain.
CO3	Understand and apply the knowledge of chemical equilibrium as required in core area
CO4	Concept of Surface phenomena & Colloids and its application
CO5	Basic ideas & application of Radioactive elements

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	TITLE: CHEMICAL EQUATIONS AND CALCULATIONS 1.1 Atomic weight, AMU, molecular weight & equivalent weight 1.2 Mole concept (numerical problems) 1.3 Concentration terms (Molarity, Normality , Molality, PPM) with numerical 1.4 Oxidation number 1.5 Stoichiometry (balancing of chemical equation and calculations using chemical equation) Course Outcome: CO1 Teaching Hours : 8 hrs
2	TITLE: PERIODIC TABLE & CHEMICAL BONDING 2.1 Periodic table & periodic properties. 2.2 Valancy, Cause of bonding, Electrovalent, Covalent and Coordinate bond, 2.3 valance bond theory, VSEPR theory 2.4 Hybridization and prediction of shape of molecules & ions 2.5 Molecular orbital theory, M.O. diagram for diatomic molecules, Hydrogen bond. Course Outcome: CO2 Teaching Hours : 8 hrs
3	TITLE: CONCEPTS OF ACIDS AND BASES & EQUILIBRIUM

	3.1 Various concepts of acids and bases 3.2 law of chemical equilibrium, Ostwald's dilution law, 3.3 ionization of water, pH, common ion effect 3.4 Buffer solution Henderson's equation 3.5 solubility product and its application Course Outcome: CO3 Teaching Hours : 8 hrs
4	TITLE: COLLOIDS & SURFACE PHENOMENA 4.1 Introduction, types of colloidal system 4.2 Distinguish between colloids, true solution, and suspension 4.3 Properties of colloidal solution (Tyndal effect, Brownian movement and Electrophoresis) 4.4 Adsorption, difference between adsorption & absorption 4.5 Types of adsorption Course Outcome: CO4 Teaching Hours : 8 hrs
5	TITLE: RADIOACTIVITY 5.1 Definition, Characteristics of Alpha, Beta and Gamma rays 5.2 Group displacement law, Radioactive decay 5.3 Half-life period, Radio Carbon dating, 5.4 Nuclear fission and fusion 5.5 Applications of radioactive isotopes Course Outcome: CO5 Teaching Hours : 8 hrs

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Physical Chemistry Vol. 1, 2, 3, 4	K L Kapoor, 6 th , Mc Graw Hill	10-9353165180
2.	Comprehensive Chemistry XI & XII	Laxmi Publication	13:978-8131803776
3.	Pradeep's New Course Chemistry for Class 11&12 (Vol. 1 & 2)	S.C. Kheterpal, S. N. Dhawan, Pradeep, 2020	9789391966355
4.	NCERT Chemistry for Class XI & XII	NCERT, 2018	81-7450-648-9

BASICS OF ELECTRICAL & ELECTRONICS

PROGRAMME: B.Sc. Medical Lab Technology										
COURSE CODE: BMT 105			COURSE TITLE: BASICS OF ELECTRICAL & ELECTRONICS							
COMPULSORY / OPTIONAL: COMPULSORY										
Teaching Scheme and Credits					EXAMINATION SCHEME					
L	T	P	HOURS/WEEK	CREDITS	QUIZ I	MID	QUIZ II	ASSESSMENT	FINAL	TOTAL
3	-	-	3	3	10	25	10	05	50	100

RATIONALE: Electrical and electronic engineering forms the practical technology, improving the devices and systems used in biomedical instruments and devices. Hence this subject serves as a foundation course to the bio medical lab technology course.

COURSE OUTCOMES

CO1	Develop the essential skills for understanding and interpreting DC circuits
CO2	Learn and analyze AC circuits.
CO3	Learn and appreciate the operation and applications of motors & generators and electrical safety systems.
CO4	Acquire necessary ability to distinguish between various semiconductor materials and devices.
CO5	Learn and apply BJTs & Op-Amps to realize simple analog and mathematical operations.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	ELECTRICAL ELEMENTS AND THEIR CHARACTERISTICS AND DC CIRCUITS 1.1 Sources: voltage source, current source. 1.2 Electrical Elements: Resistance, Inductance, Capacitance. 1.3 Equivalent Resistances and capacitances- series & parallel connections 1.4 DC circuits- Ohm's Law, Kirchoff's Law. 1.5 DC circuits -Loop current & node voltage method. Course Outcome: CO1 Teaching Hours : 6 hrs
2	AC SINGLE PHASE AND THREE PHASE CIRCUIT 1.1 Introduction- RMS & Average value, form factor, phasor quantities, impedance, power, power factor, active, reactive and apparent power. 1.2 Common signals & their wave form 1.3 Introduction to AC three phase system 1.4 Comparison between single phase and three phases 1.5 Star & Delta Transformations Course Outcome: CO2 Teaching Hours : 6 hrs

3	<p>ELECTRICAL MACHINE AND SAFETIES IN ELECTRICAL SYSTEM</p> <p>1.1 Transformer, working principle of transformer, Auto transformer, Single and 3-ϕ transformer</p> <p>1.2 DC generator and motor.</p> <p>1.3 AC generator and motor.</p> <p>1.4 Safeties in electrical system- Fuse, Circuit Breaker, Switches, Connectors, Relays and Earthing.</p> <p>1.5 Introduction to SMPS, UPS, CFL and LED lights.</p> <p>Course Outcome: CO3 Teaching Hours : 6 hrs</p>
4	<p>INTRODUCTION TO MATERIALS, SEMICONDUCTOR AND RECTIFIERS</p> <p>1.1 Energy bands, Forbidden band, Conductor, Semiconductor, Insulator.</p> <p>1.2 Classification of Semiconductors-Intrinsic & Extrinsic; P Type & N Type</p> <p>1.3 PN junction, Diode characteristic</p> <p>1.4 Zener diode, V-I characteristics, Applications of Zener diode.</p> <p>1.5 Rectifiers- Half wave, Full wave centre-tapped, Bridge rectifier, Rectifier filter,</p> <p>Course Outcome: CO4 Teaching Hours : 6 hrs</p>
5	<p>TRANSISTOR AND OPERATIONAL AMPLIFIER</p> <p>1.1 Fundamentals of Transistor, Transistor as an Amplifier, C.B, C.E & C.C configuration</p> <p>1.2 Load line & Q-point of BJT, Frequency response of amplifier.</p> <p>1.3 Introduction to operational amplifier (OP-AMP), ideal characteristics of OP-AMP; IC-741- PIN diagram & Specifications</p> <p>1.4 OP-AMP Configuration- Inverting, Non-Inverting &</p> <p>1.5 OP-AMP Applications: Adder, Subtractor, Integrator and Differentiator circuit.</p> <p>Course Outcome: CO5 Teaching Hours : 6 hrs</p>

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication
1	Basic Electrical Science & Technology,	K. Murugesh Kumar, Vikas Publishing.
2	Electronics Fundamentals & Applications	D. Chattodhay and P.C. Rakshit, New Age International.
3	Basic Electrical Engineering	V.N Mittle, Tata McGraw Hill Publishing Company
4	Electronics Devices and Circuits Theory,	R.L.Boylestade and L.Nashelsky, PHI
5	An Introduction to Electronic Devices and Circuits	Allen Mottershed, PHI)
6	Electrical Installation Estimating and Costing	J.B Gupta, S.K Kataria & Sons Publishers

E-REFERENCES:

1. www.circuitglobe.com
2. www.courses.lumenlearning.com
3. www.allaboutcircuits.com

LABORATORY MATHEMATICS

PROGRAMME: B. Sc. Medical Lab Technology							
COURSE CODE: BMT 107		COURSE TITLE: LABORATORY MATHEMATICS					
COMPULSORY / OPTIONAL: COMPULSORY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	Q-20, TA-5, MID-25	50	100

L= Lecture, T= Tutorial and P= Practical, Q= Quiz, TA= Teacher Assesment, MID= Mid Semester Exam

RATIONALE: Provide knowledge of Mathematics for understanding the calculations used in the Medical Laboratory Environment with analysis and interpretation of data produced by various medical instruments.

COURSE OUTCOMES

CO1	Students will get proficient in technical details regarding calculations necessary for Laboratory Technology.
CO2	Students will get aware of the International System of Units and required computations used for weighing and measuring in different Laboratory settings.
CO3	Computations of Concentrations and Calculation of Doses have direct applications in medical laboratory technology, so the required skill will be developed with this module.
CO4	Mathematical skill required to compute the Dilution, Concentration, and Alligation in pharmaceutical compounding is of utmost importance in medical laboratory settings, thus, the course will develop competence in the topic.
CO5	Students will develop necessary skills in graphical and statistical techniques used in Laboratory technology.

COURSE CONTENT DETAILS:

MODULES WITH TOPICS
<p>1. MODULE-I Fundamentals of Pharmaceutical Calculations</p> <p>1.1. Number and numerals, kinds of numbers, Common and decimal fractions, Ratio, Proportion, and Variation.</p> <p>1.2. Dimension analysis, Significant figures, Estimation. Percentage of errors, Measurement of volume.</p> <p>1.3. Measurement of weight, Aliquot method of weighing and measuring, least weighable quantity method of weighing.</p> <p><i>Course Outcome: CO1 Teaching Hours: 8 hrs</i></p>
<p>2. MODULE-II International System of Units and Pharmaceutical Measurements</p> <p>2.1. Guidelines for correct use of the SI, Measure of length, Measure of volume, Measure of weight, Fundamental computation, Relation of the SI to other systems of measurement.</p> <p>2.2. Density versus specific gravity, calculating the specific gravity of liquids, use of specific gravity in weight and volume calculations, special consideration of specific gravity, and calculating specific volume.</p> <p>2.3. Measurement of volume, Measurement of weight, Aliquot method of weighing and measuring, Least weighable quantity method of weighing, Percentage of errors.</p>

Course Outcome: CO2 Teaching Hours: 8 hrs

3. MODULE-III Expressions of Concentrations and Calculation of Doses

3.1. Percentage, percentage preparations, percentage weight in volume, percentage volume in volume, percentage weight in weight, use of ratio in compendia standards, ratio strength, simple conversion of concentration to “mg/mL”, parts per million.

3.2. Dose Definitions, General Considerations of Dosage, Patient Parameters, Drug Dosage Based on Age, Body Weight, and Surface Area.

Course Outcome: CO3 Teaching Hours: 8 hrs

4. MODULE-IV Dilution, Concentration, and Allegation

4.1. Relationship between strength and concentration in pharmaceutical compounding, dilution, and concentration of liquids, stock solutions, dilution of alcohol, acids, etc.

4.1. Dilution and concentration of solids and semisolids, triturations and allegation, Specific gravity of mixtures.

Course Outcome: CO4 Teaching Hours: 8 hrs

5. MODULE-V Basic Graphical and statistical methods

5.1. Logarithm, Linear relationships on Rectangular Graph paper, Linear relationships on semi-logarithmic graph paper, Other methods of data representation.

5.2. Array, Frequency distribution, Histograms, Central tendencies, Averages, Measures of variation.

Course Outcome: CO5 Teaching Hours: 8 hrs

TEXT AND REFERENCE BOOKS

S. N.	Title	Author, Publisher, Edition, and Year of publication	ISBN
1.	Pharmaceutical Calculations	Howard C. Ansel, Mitchell J Stoklosa. 12 th Edition, Wolters Kluwer (India) Pvt. Ltd. January 2006.	ISBN-13 : 978-0781762656
2.	Fundamental Laboratory Mathematics	Lela Buckingham. F. A. Davis Company, Philadelphia. 1 st Edition 2014.	ISBN-13 : 978-0803629493
3.	Clinical Laboratory Mathematics (Pearson Clinical Laboratory Science) 1st Edition,	Mark D. Ball.—1st ed. (Pearson clinical laboratory science series)	ISBN-13: 978-0-13-234437-1

E-REFERENCES:

1. [MyLab Health Professions | Pearson](#)

COMMUNICATION AND PROFESSIONAL SKILLS

PROGRAMME: B. Sc. Medical Lab Technology							
COURSE CODE: BMT 109		COURSE TITLE: COMMUNICATION AND PROFESSIONAL SKILLS					
COMPULSORY / OPTIONAL: COMPULSORY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

Course Objectives

This course enables the students:

A.	To demonstrate ability to listen to and comprehend complex speech in English, listen to explanations, descriptions, messages, news stories, opinions, solutions, etc.
B.	To demonstrate ability to speak effectively in English with peers, teachers and others, handle the various speaking situations in their academic and social sphere with confidence
C.	To demonstrate ability to read and analyse functional texts with confidence; apply critical thinking, analysis and problem-solving skills to the reading material
D.	To demonstrate ability to write messages, personal accounts, critical reviews, short biographies, describe processes, write persuasive essays, etc.
.E	To demonstrate a strong hold on functional grammar which helps them avoid common errors in communication

Course Outcomes

After the completion of this course, students will be able to:

1.	Communicate confidently in English with their peers and teachers in the immediate environment and with colleagues, clients, etc. in their future workplaces
2.	Apply their learning of English to domain subjects and make presentations, posters, write research papers, lab reports, etc with confidence
3.	Handle communicative situations in their academic like such as conversations, discussions, interviews, presentations, seminars, webinars, etc. with confidence
4.	Prepare for their future workplaces and their requirements such as handling team huddles, meetings, phone calls, client visits, field visits, inspections, etc.
5.	Apply critical thinking abilities to analyse problems, brainstorm solutions, handle situations that require persuasive skills, etc.

Module I: Effective Listening

The importance of listening; Listening for descriptions of people; listening for opinions; listening for complaints; Listening to people making, accepting, and declining requests; Listening to news stories; listening to messages and a podcast; Process of Listening, Types of Listening, Barriers to Effective Listening, Listening at different managerial levels.

Listening for information about living abroad; listening to opinions; Listening to complaints; Listening to environmental problems; listening for solutions; Listening to descriptions of important events; listening to regrets and explanations; Listening to explanations; listening for

the best solution; Listening to past obstacles and how they were overcome; listening for people's goals for the future

Module II: Speaking with Confidence

Describing personalities; expressing likes and dislikes; agreeing and disagreeing; complaining; Talking about possible careers; describing jobs; deciding between two jobs; Making direct and indirect requests; accepting and declining requests; Narrating a story; describing events and experiences in the past; Talking about traveling abroad; expressing emotions; describing cultural expectations; giving advice; Describing problems; making complaints; explaining something that needs to be done; Identifying and describing problems; coming up with solutions; Asking about preferences; discussing different skills to be learned; talking about learning methods; talking about life skills; asking for and giving advice or suggestions; talking about things to be accomplished in the future; Describing milestones; describing turning points; describing regrets and hypothetical situations; Describing qualities for success; giving reasons for success; interviewing for a job; talking about ads and slogans; Drawing conclusions; offering explanations; Giving opinions for and against controversial topics; offering a different opinion; agreeing and disagreeing

Module III: Art of Reading

Reading about unusual social networking sites; Reading about different types of workplaces; Reading about talking to friends about difficult topics; Types of Reading, Methods of Reading, Reading Comprehension.

Reading about the reliability of online content; Reading about a problem with a ride-sharing service; Reading about a creative solution to a problem; Reading about different studying styles; Reading about young scientist; Reading about futurists and their predictions for the year 2050; Reading about a conflict and advice on how to fix it; Reading about advertisements; Reading about unexplained events; Reading about a job role; Reading about plagiarism in the digital age

Module IV: Writing Skills

Writing a description of a good friend; Writing about two career choices; Writing a message with requests; Writing a personal account; Writing a pamphlet for tourists; Writing a critical online review; Writing a post on a community website; Writing about a skill; Writing a message of advice; Writing a biography; Writing a message of apology; Writing a TV or web commercial; Writing about a process; Writing a persuasive essay; Writing a personal statement for an application

Module V: Advanced Writing Skills

Art of condensation: Précis writing, Summary, Abstract, Synopsis, Paraphrasing; Paragraph writing; Essay writing: Writing a persuasive essay; Writing a biography; Writing about a process; Writing a personal statement for an application; Writing a critical online review; Writing about a complicated situation; Report writing; Writing technical proposals

Text Books:

- T1. Communication Skills IInd edition, Sanjay Kumar & PushpLata, Oxford University Press
- T2. Business Correspondence and Report Writing,R.C.Sharma, Krishna Mohan.Mcgraw Hill
- T3. Communication for Business,Shirley Taylor, V.Chandra, Pearson
- T4. Basic Business Communication- .Lesikar I Flatley, McGraw Hill.
- T5. Business Communication Today ,Bovee, Thill and Chatterjee, Pearson
- Coursebook: *Interchange 5 edition Level 3*, Jack C. Richards, Jonathan Hull, Susan Proctor, Cambridge University Press
- Components: Student's Book with online self-study (print/online bundle)

HUMAN ANATOMY AND PHYSIOLOGY LAB- I

PROGRAMME: B. Sc. Medical Lab Technology							
COURSE CODE: BMT 102			COURSE TITLE: HUMAN ANATOMY AND PHYSIOLOGY LAB- I				
COMPULSORY / OPTIONAL: COMPULSORY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEE K	CREDI T	PE	FINAL	TOTAL
-	-	3	03	1.5	60	40	100

RATIONALE: Motto of Teaching

COURSE OUTCOMES:

CO1	To understand the basics and microscopic studies of anatomy and physiology and related organelles.
CO2	The students may understand the basics structure, types, divisions and joints of skeleton system and its various role.
CO3	The students may understand and develop the skills about the collection of blood, body fluids, blood components and related challenges that helps in human physiology.
CO4	The students may understand the anatomy and physiology of respiratory, digestive system, liver and related organelles that help for medical technology.
CO5	The students may understand about the anatomy of human circulatory system, position, chambers, heart rate and all basic concepts of blood circulation.

(CO= Course outcome Module wise)

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	<p>TITLE: The anatomic and physiological organization of human body</p> <p>1.1 To study the microscope and its related accessories. 1.2 To study the permanent slide of animal and plant cells. 1.3 To measure the own blood pressure by using sphygmomanometer.</p> <p>Course Outcome: CO1 Teaching Hours : 9 hrs Marks: 20 (PE+ Final)</p>
2	<p>TITLE: Skeletal system, bones, joint and muscle</p> <p>1.1 To study the human skeleton systems by using chart and models. 1.2 Demonstration of different types bones of the human skeleton systems. 1.3 Demonstration of division of skeleton system- Appendicular & Axial</p> <p>Course Outcome: CO2 Teaching Hours : 9 hrs Marks: 20 (PE+ Final)</p>
3	<p>TITLE: The body fluids, blood morphology, chemistry and their function</p> <p>1.1 Determination of haemoglobin by using Sahli's method.</p>

	<p>1.2 Estimation of bleeding time of own blood sample. 1.3 Estimation of clotting time of own blood sample. 1.4 Estimation of erythrocytes sedimentation rate of own blood sample.</p> <p>Course Outcome: CO3 Teaching Hours : 12 hrs Marks: 20 (PE+ Final)</p>
4	<p>TITLE: The Respiratory system, digestive system, structure of liver and their function</p> <p>1.1 To study and draw the structure of Respiratory system by using charts and model. 1.2 To study and draw the structure of Digestive system by using charts and model. 1.3 Estimation of Salivary Amylase on different temperature.</p> <p>Course Outcome: CO4 Teaching Hours : 9 hrs Marks: 20 (PE+ Final)</p>
5	<p>TITLE: Cardiovascular system and its functions</p> <p>1.1 To study and draw the structure of Cardiovascular system by using charts and model. 1.2 To study the flow of circulations of cardiovascular system by using chart and models. 1.3 To study the various types of permanent slide of heart, liver, kidney and lungs.</p> <p>Course Outcome: CO5 Teaching Hours : 9 hrs Marks: 20 (PE+ Final)</p>

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication
1	Best and Taylor's Physiological Basis of Medical Practice	Best & Taylor's: William & Wilkins, Baltimore
2	Human Anatomy – Regional & Applied	Chaurasia; Part I, II, III, CBS Publishers & Distributors, New Delhi
3	Human Physiology	C.C. Chatterjee; Vols. I & II, Medical Allied Agency, Calcutta
4	Textbook of Medical Physiology	Guyton & Hall; WB Saunders Company
5	Exercise Physiology Laboratory Manual	Adams, Gene; W.C.B. McGraw Hill, New York: 1998

E-REFERENCES:

Website url:

1. <https://www.medicalnewstoday.com/articles/320444>
2. <https://www.wikipedia.org/>
3. <https://microbiologyinfo.com/>
4. <https://www.medicalnewstoday.com/articles/315133>

CHEMISTRY FOR MLT LAB

PROGRAMME: B. Sc. Medical Lab Technology							
COURSE CODE: BMT 104			COURSE TITLE: Chemistry for MLT lab				
COMPULSORY / OPTIONAL: COMPULSORY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEEK	CREDIT	PE	FINAL	TOTAL
-	-	3	2	1	60	40	100

COURSE OUTCOMES

CO1	To acquire skills in quantitative pathological parameters ,handling of apparatus frequently used in Acidimetry-alkalimetry & Redox Titrations ,
CO2	To understand the quality and importance of water for health & hygiene of humans and animals (Biotic sector)
CO3	To learn about Characteristic of oil (viscosity.) and determination of pH of Buffer solution
CO4	To understand about the weight related reactions (Gravimetry) and calculations, used in pathological laboratories.
CO5	To acquire the skills for purification of compounds by crystallization method and qualitative analysis (anions &cations) of salt

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	<p>TITLE - Quantitative Analysis</p> <p>1.1 To find the volume of one drop of water.</p> <p>1.2 Preparation of standard solution of Oxalic acid.</p> <p>1.3 Preparation of standard solution of Sodium Carbonate.</p> <p>1.4 Standardisation of Sodium Hydroxide with the help of Oxalic acid</p> <p>1.5 Determination of strength of a given solution of Hydrochloric acid by titrating it against standard Sodium Carbonate solution.</p> <p style="text-align: center;">Teaching Hours : 8 hrs</p>
2	<p>TITLE- Water Analysis.</p> <p>2.1 To determine the Carbonate Hardness of a given sample of water.</p> <p>2.2 To determine the Non Carbonate Hardness of a given sample of water</p> <p>2.3 To determine the Total Hardness of a given sample of water by EDTA method.</p> <p>2.4 To determine the PH of given solution by the colourimetry method.</p> <p>2.5 To determine the hydroxyl , carbonate, and bicarbonate alkalinity separately of the given sample of water.</p>

	Teaching Hours : 8 hrs
3	TITIAL- Titration related to Redox Reaction and characteristic of oil (viscosity.) 3.1 Estimation of Mohr's salt using standard KMnO_4 . 3.2 To determine the strength of a given Potassium dichromate solution with N/20 sodium thiosulphate (Hypo) solution. 3.3 To determine the viscosity of oil with the help of Redwood Viscosity. 3.3 To prepare Buffer solution and standardisation of pH meter . Teaching Hours : 4 hrs
4	TITLE -Gravimetric Practical 4.1.To determine the strength of silver ions in a given solution of AgNO_3 using chloride ion. 4.2. Estimation of Barium as Barium Sulphate. Teaching Hours : 4 hrs
5	TITLE- Qualitative Analysis. 5.1 Crystallisation of impure sample of any one of the following: Alum, Copper Sulphate, Benzoic acid. 5.2 Determination of one anion and one cation in a given salt. Cation- Pb^{2+} , Cu^{2+} , Al^{3+} , Fe^{3+} , Mn^{2+} , Ni^{2+} , Zn^{2+} , Co^{2+} , Ca^{2+} , Sr^{2+} , Ba^{2+} , Mg^{2+} , NH_4^+ Anion- $(\text{CO}_3)^{2-}$, S^{2-} , NO_2^- , SO_3^{2-} , SO_4^{2-} , NO_3^- , Cl^- , Br^- , I^- , PO_4^{3-} , $\text{C}_2\text{O}_4^{2-}$, CH_3 Teaching Hours : 8 hrs

References:

S. N.	Title	Author, Publisher, Edition and Year of publication
1.	Laboratory Manual on Engineering Chemistry	S.K Bhasin, Sudha Rani(Author) Dhanpat Rai Publishing Company.(New Edition)
2.	The Language of Chemistry or Chemical Equation	G.D Tuli & P.L.Soni

BASICS OF ELECTRICAL & ELECTRONICS LAB

PROGRAMME: B. Sc. Medical Lab Technology											
COURSE CODE: BMT 106			COURSE TITLE: BASICS OF ELECTRICAL & ELECTRONICS LAB.								
COMPULSORY / OPTIONAL: COMPULSORY											
Teaching Scheme and Credits					EXAMINATION SCHEME						
					MID (50)				FINAL(50)		
L	T	P	HOURS/WE EEK	CRED IT	PE	LAB. NOTE - BOOK	QU IZ	ASSESS MENT	PERFORMA NCE TEST	EN D VI VA	TOT AL
-	-	2	2	1	25	10	10	05	25	25	100

RATIONALE: Electrical and electronic engineering forms the practical technology, improving the devices and systems used in biomedical instruments and devices. Hence this lab course serves as a foundation course to the bio medical lab technology course.

COURSE OUTCOMES

CO1	Develop the essential skills for understanding and interpreting DC circuits
CO2	Learn and analyze AC circuits.
CO3	Learn and appreciate the operation and applications of motors & generators and electrical safety systems.
CO4	Acquire necessary ability to distinguish between various semiconductor materials and devices.
CO5	Learn and apply BJTs & Op-Amps to realize simple analog and mathematical operations.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	Study and Identification of electrical tools, electrical symbols, electrical instruments and safety precautions.
2	Identification of various electrical safety devices and components (Fuse, Circuit breaker, Relay & Connectors).
3	To construct and verify the (a) KCL (b) KVL.
4	Identification of various types of wires and cables.
5	Connection and running of single phase (1- ϕ) A.C motor.
6	To identify the various types of transformers and D.C machines.

7	Measurement of voltage and frequency of an input signal using CRO and Function generator
8	Construct and plot the V-I characteristics of PN Junction diode and find the cut-in voltage.
9	Construct and plot the V-I characteristics of Zener diode and find the breakdown voltage.
10	Construct the rectifier circuit with or without filter and find the ripple factor and efficiency.
11	Identify and testing of different types of transistor.
12	To plot the V-I characteristics of transistor in common Emitter configuration and to find its current gain (β_{dc}).
13	Construct the circuit for inverting amplifier and determine its voltage gain (A_v).

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication
1	Basic Electrical Science & Technology,	K. Murugesh Kumar, Vikas Publishing.
2	Electronics Fundamentals & Applications	D. Chattodhay and P.C. Rakshit, New Age International.
3	Basic Electrical Engineering	V.N Mittle, Tata McGraw Hill Publishing Company
4	Electronics Devices and Circuits Theory,	R.L.Boylestade and L.Nashelsky, PHI
5	An Introduction to Electronic Devices and Circuits	Allen Mottershed, PHI)
6	Electrical Installation Estimating and Costing	J.B Gupta, S.K Kataria & Sons Publishers

E-REFERENCES:

1. www.circuitglobe.com
2. www.courses.lumenlearning.com
3. www.allaboutcircuits.com

Sports & Yoga/ NSS/NCC/CA

SPORTS AND YOGA

PROGRAMME: B. Sc. Medical Lab Technology							
COURSE CODE: BHS 108			COURSE TITLE: SPORT & YOGA				
COMPULSORY / OPTIONAL: COMPULSORY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEEK	CREDIT	PE	FINAL	TOTAL
		2	2	1	60	40	100

Course Objectives:

- To make the students understand the importance of sound health and fitness principles as they relate to better health.
- To expose the students to a variety of physical and yogic activities aimed at stimulating their continued inquiry about Yoga, physical education, health and fitness.
- To create a safe, progressive, methodical and efficient activity based plan to enhance improvement and minimize risk of injury.
- To develop among students an appreciation of physical activity as a lifetime pursuit and a means to better health

Course Outcomes:

On successful completion of the course the students will be able to: (i) Practice Physical activities and Hatha Yoga focusing on yoga for strength, flexibility, and relaxation. (ii) Learn techniques for increasing concentration and decreasing anxiety which leads to stronger academic performance. (iii) Learn breathing exercises and healthy fitness activities (iv) Understand basic skills associated with yoga and physical activities including strength and flexibility, balance and coordination. (v) Perform yoga movements in various combination and forms. (vi) Assess current personal fitness levels. (vii) Identify opportunities for participation in yoga and sports activities. (viii) Develop understanding of health-related fitness components: cardiorespiratory endurance, flexibility and body composition etc. (ix) Improve personal fitness through participation in sports and yogic activities. (x) Develop understanding of psychological problems associated with the age and lifestyle

Course Content:

- Introduction to Physical Education, Meaning & definition of Physical Education, Aims & Objectives of Physical Education, Changing trends in Physical Education
- Olympic Movement, Ancient & Modern Olympics (Summer & Winter), Olympic Symbols, Ideals, Objectives & Values, Awards and Honours in the field of Sports in India (Dronacharya Award, Arjuna Award, Dhayanchand Award, Rajiv Gandhi Khel Ratna Award etc.)

- Physical Fitness, Wellness & Lifestyle, Meaning & Importance of Physical Fitness & Wellness, Components of Physical fitness, Components of Health-related fitness, Components of wellness, Preventing Health Threats through Lifestyle Change, Concept of Positive Lifestyle
- Fundamentals of Anatomy & Physiology in Physical Education, Sports and Yoga, Define Anatomy, Physiology & Its Importance, Effect of exercise on the functioning of Various Body Systems. (Circulatory System, Respiratory System, Neuro-Muscular System etc.)
- Kinesiology, Biomechanics & Sports, Meaning & Importance of Kinesiology & Biomechanics in Physical Edu. & Sports, Newton's Law of Motion & its application in sports. Friction and its effects in Sports.
- Postures

Meaning and Concept of Postures.

Causes of Bad Posture. Advantages & disadvantages of weight training. Concept & advantages of Correct Posture. Common Postural Deformities – Knock Knee; Flat Foot; Round Shoulders; Lordosis, Kyphosis, Bow Legs and Scoliosis. Corrective Measures for Postural Deformities.

Sports Activity

References: 1. Modern Trends and Physical Education by Prof. Ajmer Singh. 2. Light On Yoga By B.K.S. Iyengar. 3. Health and Physical Education – NCERT (11th and 12th Classes)

BASIC WORKSHOP I (HEALTHCARE)

PROGRAMME: B. Sc. Medical Lab Technology							
COURSE CODE: BMT 116			COURSE TITLE: BASIC WORKSHOP I (HEALTHCARE)				
COMPULSORY / OPTIONAL: COMPULSORY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEEK	CREDIT	PE	FINAL	TOTAL
-	-	3	03	01	60	40	100

RATIONALE: Motto of teaching

COURSE OUTCOMES

CO1	Understanding of applications of commonly used laboratory glasswares and equipments
CO2	Concept of basic laboratory safety and code of conduct for medical laboratory personnel
CO3	Knowledge of hazardous reagents and precautions in handling these chemicals
CO4	Awareness of recording of various physiological parameters and their analysis
CO5	Techniques collection of various types of specimens

(CO= Course outcome Module wise)

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	TITLE: Common laboratory glasswares and equipments 1.1 Introduction to Common Laboratory Glass Wares 1.2 Introduction to basic Laboratory Equipments Course Outcome: CO1 Teaching Hours : 09 hrs Marks: 20 (PE+FINAL)
2	TITLE: Code of conduct and basic laboratory safety 1.1: Basic Laboratory Safety 1.2 Code of Conduct for Medical Laboratory Personnel Course Outcome: CO2 Teaching Hours : 6 hrs Marks: 20(PE+FINAL)
3	TITLE : Hazardous reagents /Chemicals 1.1 Labelling of Hazardous Reagents or Chemicals Course Outcome: CO3 Teaching Hours : 06 hrs Marks: 20(PE+FINAL)
4	TITLE: Recording of various physiological parameters 1.1 Recording of Physiological Parameters - body temperature, pulse and respiration etc. 1.2 Auscultation for Heart Sounds 1.3 Artificial Respiration 1.4 Determination of respiratory Parameters- Vital capacity, Tidal Volume etc. Course Outcome: CO4 Teaching Hours : 12 hrs Marks: 20(PE+FINAL)
5	TITLE: Phlebotomy 1.1 Introduction to techniques of Phlebotomy (Specimen Collection) 1.2 Separation of Serum & Plasma

	Course Outcome: CO5	Teaching Hours : 06 hrs	Marks: 20(PE+FINAL)
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REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1	Medical Laboratory Technology: Methods and Interpretations	Ramnik Sood, Second Edition, Jaypee Publishers	ISBN : 9789351523338
2	Medical Laboratory Technology: A Procedure Manual for Routine Diagnostic Tests	Kanai L Mukherjee, Third Edition, Tata McGraw-Hill Publishing Company Limited	ISBN: 0070076631
3	An Introduction to Practical Biochemistry”,	David T Plummer, Third Edition, Tata McGraw-Hill Publishing Company Limited.	ISBN · 9780070994874

E-REFERENCES:

1. <https://www.mccmdclinic.org/overview-of-common-laboratory-equipments/>
2. <https://ehs.yale.edu/sites/default/files/files/ppe-posters.pdf>
3. <https://www.biologydiscussion.com/hematology-2/laboratory-hematology-2/study-of-phlebotomy-techniques-in-laboratory-hematology/80385>

2ND SEMESTER
BMLT

HUMAN ANATOMY AND PHYSIOLOGY- II

PROGRAMME: B. Sc. Medical Lab Technology							
COURSE CODE: BMT 201			COURSE TITLE: HUMAN ANATOMY AND PHYSIOLOGY- II				
COMPULSORY / OPTIONAL: COMPULSORY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK EK	CREDITS	PE	FINAL	TOTAL
3	-	-	3	3	50	50	100

L= Lecture, T= Tutorial and P= Practical, Q= Quiz, TA= Teacher Assessment, MID= Mid Semester Exam

RATIONALE: To provide the advance knowledge of Human Anatomy and Physiology and its necessity to develop the concepts and challenges related to medical and health care system.

COURSE OUTCOMES

CO1	To understand the Anatomy of urinary system, general properties, abnormal constituents and related diseases found in urine.
CO2	To understand the anatomy of nervous system, classifications, role of brains and factors affecting nerve impulse that required in medical sciences and technology.
CO3	The students may understand the role of glands, secretions of hormones and its mechanism of actions and also know the importance of lymphatic system, their functions and related abnormalities by various medical technologies.
CO4	To understand the anatomy of reproductive system of male and females, hormones involved, fertilization, pregnancy, fertility related terms and there functions that help for medical sciences.
CO5	To understand the nutrition and sense organs, their anatomy, roles in human physiology and challenges to maintain whole mechanism and related studies.

(CO= Course outcome Module wise)

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	<p>TITLE: Urinary System</p> <p>1.1 Introduction and anatomy of urinary system 1.2 Role of kidney, ureters, urinary bladder and urethra 1.3 Important functions of kidney, sign and symptoms of kidney failure 1.4 General characteristics of urine and role of nephron 1.5 Normal composition, abnormal types of urine, abnormal constituents and related diseases</p> <p>Course Outcome: CO1 Teaching Hours : 8 hrs</p>

2	<p>TITLE: Nervous System</p> <p>1.1 Introduction of nervous system, classification and functions of nervous system 1.2 Structure, classification and functions of Neuron 1.3 Anatomy of brain, role of autonomic nervous system and functions of Brain 1.4 Synapse and its classification 1.5 Role of Cerebrospinal fluids (CSF)- composition, circulation, its function and factors that affect neurons and brain</p> <p>Course Outcome: CO2 Teaching Hours : 8 hrs</p>
3	<p>TITLE: Endocrine and Exocrine glands and functions of Lymphatic system</p> <p>1.1 Introduction of glands 1.2 Name and function of major human endocrine glands and their hormones 1.3 Types and mechanism of exocrine glands 1.4 Introduction of Lymphatic system and their functions 1.5 Role of lymph, spleen, thymus, mucosa associated lymphatic tissues and related diseases</p> <p>Course Outcome: CO3 Teaching Hours : 8 hrs</p>
4	<p>TITLE: Reproductive System</p> <p>1.1 Introduction to reproductive system 1.2 Male reproductive system- Primary and Accessory organs and their functions 1.3 Role of hormones in reproductive system, spermatogenesis, fertilization and related terms 1.4 Anatomy of female reproductive system and their functions. 1.5 The menstrual cycle, menopause, ovulation, pregnancy test, fertility, fertility control, Infertility, combined infertility and related terms</p> <p>Course Outcome: CO4 Teaching Hours : 8 hrs</p>
5	<p>TITLE: Sense organs; Eye, Ear, Nose, Tongue and Skin - Structure & their functions</p> <p>1.1 Nutrition - Carbohydrate, protein, fats and sources of energy 1.2 Anatomy, structure and function of Eye 1.3 Anatomical studies, structure and function of Ear 1.4 Anatomical structure and functions of nose and tongue 1.5 Anatomical structure, layer of skin, abnormal skin colors and functions of skin.</p> <p>Course Outcome: CO5 Teaching Hours : 8 hrs</p>

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication
1	Best and Taylor's Physiological Basis of Medical Practice	Best & Taylor's: William & Wilkins, Baltimore
2	Human Anatomy – Regional & Applied	Chaurasia; Part I, II, III, CBS Publishers & Distributors, New Delhi
3	Human Physiology	C.C. Chatterjee; Vols. I & II, Medical Allied Agency, Calcutta
4	Textbook of Medical Physiology	Guyton & Hall; WB Saunders Company
5	Exercise Physiology Laboratory Manual	Adams, Gene; W.C.B. McGraw Hill, New York: 1998

E-REFERENCES:

1. Website url: <https://www.medicalnewstoday.com/articles/320444>
2. <https://www.wikipedia.org/>
3. <https://microbiologyinfo.com/>
4. <https://www.authorstream.com>

HEMATOLOGY I

PROGRAMME: B. Sc. Medical Lab Technology							
COURSE CODE: BMT 203			COURSE TITLE: HEMATOLOGY I				
COMPULSORY / OPTIONAL: COMPULSORY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEK	CREDIT	PE	FINAL	TOTAL
3	-	-	3	01	60	40	100

RATIONALE: Motto of teaching:

Hematology plays an important role to find out the causes of blood borne diseases by providing required laboratory results to the physician. Stained blood smears help in detecting morphological abnormalities of various cells seen in peripheral blood smears.

COURSE OUTCOMES

CO1	Understand the process of hematopoiesis. Different types of normal blood cells and give the identifying characteristics and role of each.
CO2	Discuss how the hemoglobin, hematocrit, erythrocyte to indices, and ESR are used to diagnose and to understand how specimens are collected.
CO3	Distinguish between normal and abnormal test results.
CO4	Distinguish between normal and abnormal test results
CO5	Discuss how the clinical science of hematology and the complete blood count (CBC) are used in the diagnosis and treatment of disease.

(CO= Course outcome Module wise)

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	<p>TITLE : Introduction to hematology</p> <p>1.1 : Formation of blood 1.2: composition and functions of blood. 1.3: Morphology of normal blood cells and their identification.</p> <p>Course Outcome: CO1 Teaching Hours : 8 hrs Marks: 20 (PE+FINAL)</p>
2	<p>TITLE: Anticoagulants</p> <p>1.1: Various anticoagulants and their uses 1.2: mode of action of anticoagulants 1.3: merits and demerits of anticoagulants</p>

	Course Outcome: CO2 Teaching Hours : 8 hrs Marks: 20(PE+FINAL)
3	<p>TITLE: Physiological variations</p> <p>1.1: Physiological variations of Haemoglobin (Hb) 1.2: Physiological variations of Packed Cell Volume (PCV) 1.3: Physiological variations of Total Leukocyte Count (TLC) 1.4: Physiological variations of Platelets</p> <p>Course Outcome: CO3 Teaching Hours : 8 hrs Marks: 20(PE+FINAL)</p>
4	<p>TITLE: Haemoglobinometry and Haemocytometry</p> <p>1.1: various methods of estimation of Hb 1.2: procedures of cell counts, visual as well as electronic 1.3: Procedure of red blood cell count 1.4: Procedure of white blood cell count 1.5: Procedure of platelet count</p> <p>Course Outcome: CO4 Teaching Hours : 8 hrs Marks: 20(PE+FINAL)</p>
5	<p>TITLE: Erythrocytes sedimentation rate (ESR) and Routine examination of biological fluids</p> <p>1.1: Phases of ESR 1.2: Factors influencing ESR 1.3: various methods of ESR estimation 1.4: Routine examination of urine 1.5: Examination of semen and other biological fluids such as CSF etc.</p> <p>Course Outcome: CO5 Teaching Hours : 8 hrs Marks: 20(PE+FINAL)</p>

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1	An introduction to medical laboratory technology	Baker et al., Seventh Edition, A Hodder Arnold Publication.	ISBN: 978-0750621908
2	Hematology for medical technologists	Charles F. Seiverd, Fifth Edition. Lea & Febiger, Philadelphia	ISBN: 978-0812108057
3	Technical hematology	Arthur Simmons, Third Edition, Lippincott Company.	ISBN: 0397504373
4	Pathology Practical Book	Harsh Mohan, Fifth Revised Edition, Jaypee Brothers.	ISBN, 9789390595259

E-REFERENCES:

- <https://www.coursehero.com/file/105432490/4ANTICOAGULANTS-USED-IN-HAEMATOLOGY-2ppt/>
- <https://labpedia.net/erythrocyte-sedimentation-rate-esr-solution-and/>

CLINICAL CHEMISTRY 1

PROGRAMME: B. Sc. Medical Lab Technology							
COURSE CODE: BMT 205			COURSE TITLE: Clinical Chemistry 1				
COMPULSORY / OPTIONAL: Compulsory							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	Q-20, TA-5, MID-25	50	100

RATIONALE: This course aims to provide knowledge regarding the fundamental chemical principles that govern the complex biological system. The course emphasizes how life depends on biochemical reactions and chemical changes.

COURSE OUTCOMES

CO1	To provide knowledge about identifying the structural elements of different biomolecules and features for the development and functioning of cells. It emphasizes how cells generate energy through various bioenergetic processes.
CO2	To demonstrate the role of enzymes in the bio-reactions of a living cell and provide knowledge on the estimation of different enzymes in diagnosing diseases.
CO3	To study the structural, nutritional, and diagnostic roles of carbohydrates and their metabolites in physiological and pathological processes
CO4	To study the structural, nutritional, and diagnostic roles of lipids and their metabolites in physiological and pathological processes.
CO5	To demonstrate the applicability of the metabolic role of proteins, amino acids, and nucleic acids in various biological processes. It imparts knowledge on physiological values and their importance in the diagnostic field.

(CO= Course outcome Module wise)

COURSE CONTENT DETAILS

MODULE	TOPICS/SUBTOPICS
1	<p><u>TITLE Introduction to clinical chemistry</u></p> <p>1.1 Introduction to Bio constituents & Metabolism</p> <p>1.2 Biochemistry of cell & cell membrane: Fluid mosaic model of cell membrane, functions of cell membrane</p> <p>1.3 Introduction to Bioenergetics and biological oxidation reduction reactions in living cells</p> <p>1.4 Application of Thermodynamics in Biological Reactions</p>

	1.5 Energy Rich Compounds Course Outcome: CO1
2	TITLE Enzymes 1.1 Nature, structure and Properties of Enzymes 1.2 Factors affecting Enzyme Activity, Mechanism of Enzyme Action 1.3 Nomenclature and Classification of Enzymes. Types of enzymes: Coenzyme, Isoenzymes, Multienzyme Complex 1.4 Enzymes kinetics & Inhibition 1.5 Clinical enzymology - , Therapeutic, Diagnostic & analytical uses of Enzymes with normal value of serum enzymes. Course Outcome: CO2
3	TITLE Chemistry and Metabolism of Carbohydrates 1.1 Dietary sources, Digestion & Absorption of carbohydrates 1.2 carbohydrates of biological importance 1.3 Metabolism of carbohydrate, Glycolysis, TCA Cycle 1.4 Glucose Tolerance, Blood Sugar Level, Glycosuria and Diabetes Mellitus, HbA1c 1.5 Significance and Disorder of Carbohydrate Metabolism. Course Outcome: CO3 Teaching Hours : 8 hrs
4	TITLE Chemistry and Metabolism of Lipids 1.1 Dietary sources, Digestion & Absorption of Lipids 1.2 Lipids of biological importance, Derived lipid, Sterols, Bile acids 1.3 Metabolism of Lipids 1.4 Lipid profile: Cholesterol, Triglycerides, Lipoproteins, Phospholipids 1.5 Significance & Disorder of lipid metabolism Course Outcome: CO4 Teaching Hours : 8 hrs
5	TITLE Chemistry and Metabolism of Amino acids and Proteins 1.1 Dietary sources, Digestion & Absorption of Proteins and nucleic acid 1.2 Characteristics, structure and function of Amino acid and Proteins 1.3 Biological Value and metabolism of Proteins, formation of Urea, Uric acid, Creatinine 1.4 Significance & Disorder of Protein metabolism 1.5 Structure and function of nucleic acid, Types of nucleic acid: DNA and RNA Course Outcome: CO5 Teaching Hours : 8 hrs

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1	Harper's illustrated Biochemistry	R.K Murray, D.A Bender, K.M Botham, P.J Kennelly, V.W. Rodwell & P.A Weil McGrawHill / Medical 31st edition, 2018	978-1259837937
2	Lehninger Principles of Biochemistry	David L Nelson, Michael M. Cox W.H. Freeman & Co Ltd	978-1319381493

		8 th edition , 2021	
3	Biochemistry	U. Satyanarayana & U. Chakrapani Elsevier 6 th edition,2021	978-8131264355
4	Fundamentals of Biochemistry	J.L. jain, S. Jain, N Jain S. Chand publishing, 7 th edition, 2016	978-8121924535

IT SKILLS

PROGRAMME: B. Sc. Medical Lab Technology							
COURSE CODE: BMT 207			COURSE TITLE: IT SKILLS				
COMPULSORY / OPTIONAL: COMPULSORY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

COURSE OUTCOMES

CO1	Students should learn about the working of the computer system and the role of software.
CO2	Students should understand how data is represented and processed within the computer.
CO3	Students should learn about the computer networks and the Internet, and various device involved in their setup, and also their advantages.
CO4	Students should be aware of various types of threats when connected online, and certain precautions they should take to prevent them.
CO5	Students should be familiar with various upcoming and evolving technologies in field of medicine.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	<p>TITLE Introduction to Computer Hardware and Software</p> <p>1.1 Data processing, Computer Hardware and Software, 1.2 Components of Computer, I/O Devices 1.3 Computer Memory 1.4 Types of Computer Software, Application Software, Operating System 1.5 Programming Languages, Translators.</p> <p>Course Outcome: CO1 Teaching Hours : 8 hrs Marks: 20 (PE+FINAL)</p>
2	<p>TITLE Computer Codes and Data Representation</p> <p>1.1 Data Representation: Number Systems 1.2 Conversion from one base to another 1.3 Arithmetic Operations on Binary Data 1.4 Alphanumeric Representation</p>

	Course Outcome: CO2 (PE+FINAL)	Teaching Hours : 8 hrs	Marks: 20
3	TITLE Computer Network and Internet 1.1 Data Communication, Communication Devices 1.2 Computer Networks, Type of Network 1.3 Internet, Internet Services, Internet Protocols 1.4 URL & IP Addresses 1.5 World-wide Web, Web Browsers, Web Servers Course Outcome: CO3 (PE+FINAL)	Teaching Hours : 8 hrs	Marks: 20
4	TITLE Information and Network Security 1.1 Information Security 1.2 Software Vulnerabilities 1.3 Network Security and Authentication 1.4 Cyber Security, Common Cyber Threats 1.5 Cyber Law Course Outcome: CO4 (PE+FINAL)	Teaching Hours : 8 hrs	Marks: 20
5	TITLE : Computer Techniques in Medicine 1.1 Computer Techniques in Medicine 1.2 Data Analysis in Medicine, Laboratory Computing, Computer Assisted Decision making (CMD), Care of critically ill patients 1.3 Computer assisted therapy, medical imaging 1.4 Other applications of computer-primary health care, psychiatry, physiological measurements, medical education 1.5 literature search, and as an aid to the handicapped, Limitations of Computers Course Outcome: CO5 (PE+FINAL)	Teaching Hours : 8 hrs	Marks: 20

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	“Fundamental of Computers”	V. Rajaraman, PHI	
2.	“Fundamental of Computers”	E. Balagurusamy, Mc Graw Hill	9780070141605

E-REFERENCES:

- Jaiswal. S., “Information Technology Today”, Galgotia Publication.
- Mehta. V. K., Deb. P. S., Rao. D “APPLICATION OF COMPUTER TECHNIQUES IN MEDICINE” PMID: [30510351](https://pubmed.ncbi.nlm.nih.gov/30510351/)

HISTOLOGY

PROGRAMME: B. Sc. Medical Lab Technology							
COURSE CODE: BMT 209			COURSE TITLE: HISTOLOGY				
COMPULSORY / OPTIONAL: COMPULSORY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEEK	CREDIT	PE	FINAL	TOTAL
3	-	-	3	3	50	50	100

RATIONALE: Motto of teaching :

Histology is a discipline of biology that examines the microscopic anatomy of biological tissues/organs. Histological examination of specimen is an instrumental tool to check the presence/absence of pathological/diseased conditions.

COURSE OUTCOMES

CO1	Students shall understand the significance of various steps to prepare the specimen for histological examination.
CO2	Understand to carry out the fixation process and the mechanism involved.
CO3	Get knowledge of importance of mounting and various types of mountant used.
CO4	Knowledge about various stains used for preparation of specimen shall be attained.
CO5	Students shall be acquainted with anatomy of various organs and be capable to distinguish the presence/absence of pathological conditions.

(CO= Course outcome Module wise)

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	TITLE: Introduction to histology 1.1 : Significance of histology 1.2: Microtechniques Course Outcome: CO1 Teaching Hours : 8 hrs Marks: 20 (PE+FINAL)
2	TITLE: Fixation 1.1: Methods of Fixation: Physical methods, chemical methods 1.2: General properties of fixatives 1.3: Classification of fixatives, choice of fixative. Course Outcome: CO2 Teaching Hours : 8 hrs Marks: 20(PE+FINAL)
3	TITLE: Mounting 1.1: Mounting Processing, Keeping sections on slides 1.2: Various mounting media 1.3: Treatments before staining Course Outcome: CO3 Teaching Hours : 8 hrs Marks: 20(PE+FINAL)

4	<p>TITLE: Dyes & Stains</p> <p>1.1: Dyes: Classification and nomenclature, histological staining, metachromasis and metachromatic dyes</p> <p>1.2: Staining blood and other cell suspension, connective tissue, nucleic acids, organic functional groups and protein histochemistry</p> <p>1.3: Carbohydrate and amyloid special staining procedures and lipid staining.</p> <p>1.4: Principles of metal impregnation techniques</p> <p>1.5: Demonstration and identification of minerals and pigments</p> <p>Course Outcome: CO4 Teaching Hours : 8 hrs Marks: 20(PE+FINAL)</p>
5	<p>TITLE: Histological Studies of Various System</p> <p>1.1: Circulatory system and alimentary system</p> <p>1.2: Digestive system and respiratory system</p> <p>1.3: Urinary system and reproductive system</p> <p>1.4: Lymphatic and neurosensory system</p> <p>Course Outcome: CO5 Teaching Hours : 8 hrs Marks: 20(PE+FINAL)</p>

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1	Histological and Histochemical Methods Theory and Practice	Kiernan JA, fifth edition, Butter worth & Heinemann Publication.	ISBN 9781907904325
2	Pathology Practical Book	Harsh Mohan, Fifth Revised Edition, Jaypee Brothers.	ISBN 9789390595259

E-REFERENCES:

1. <https://nif.hms.harvard.edu/sites/nif.hms.harvard.edu/files/education-files/Mountingmedia>

HUMAN ANATOMY AND PHYSIOLOGY LAB- II

PROGRAMME: B. Sc. Medical Lab Technology							
COURSE CODE: BMT 202			COURSE TITLE: HUMAN ANATOMY AND PHYSIOLOGY LAB- II				
COMPULSORY / OPTIONAL: COMPULSORY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WE EK	CRED IT	PE	FINAL	TOTAL
-	-	2	02	1	60	40	100

COURSE OUTCOMES:

CO1	To understand the anatomy of urinary system and normal urine samples general properties and related basic routine abnormalities.
CO2	The students may understand the anatomy of nervous system, role of nerves cell, brain, various types of lobes and its functions that required in medical sciences and technology.
CO3	The students may understand the role of glands, position and mechanism of secretions of hormones and also know the importance lymphatic system.
CO4	To understand the anatomy of reproductive system of male and females, it's primary and secondary sex organs and various types of process that helps in medical sciences.
CO5	To understand the anatomy of sense organs and its mechanism to resolve the various types of challenges.

(CO= Course outcome Module wise)

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	<p>TITLE: Urinary System</p> <p>1.1 To study the anatomy and physiology of urinary system by using chart and models.</p> <p>1.2 To determine the pH, Specific gravity and all general characteristics of urine.</p> <p>1.3 Microscopic examination of urine sample (Calcium oxalate and Ammonium urate crystals).</p> <p>Course Outcome: CO1 Teaching Hours : 9 hrs Marks: 20 (PE+ Final)</p>
2	<p>TITLE: Nervous System</p> <p>1.1 To study and draw the structure of Nervous system by using charts and model.</p> <p>1.2 To study the anatomy of brain and its functions by using models.</p> <p>1.3 To routine examination of cerebrospinal fluid and its components.</p> <p>Course Outcome: CO2 Teaching Hours : 9 hrs Marks: 20 (PE+ Final)</p>
3	<p>TITLE: Endocrine and Exocrine glands and functions of Lymphatic system</p> <p>1.1 To study and draw the structure of various glands by using charts and model.</p> <p>1.2 To study the various types of glands, positions and secreting hormones by using chart and models.</p> <p>1.3 To study and draw the structure of lymphatic system by using charts and model.</p> <p>Course Outcome: CO3 Teaching Hours : 9 hrs Marks: 20 (PE+ Final)</p>
4	<p>TITLE: Reproductive System</p> <p>1.1 To study and draw the structure of Male reproductive system by using charts and model.</p> <p>1.2 To study and draw the structure of female reproductive system by using charts and model.</p> <p>1.3 To study the menstrual cycle, menopause, ovulation, pregnancy, fertility and fertility control by using various chart and models.</p> <p>Course Outcome: CO4 Teaching Hours : 9 hrs Marks: 20 (PE+ Final)</p>
5	<p>TITLE: Sense organs; Eye, Ear, Nose, Tongue and Skin - Structure & their functions</p> <p>1.1 To study and draw the structure of Skin and its various layers by using charts and model.</p> <p>1.2 To study and draw the structure of Eye by using charts and model.</p> <p>1.3 To study and draw the structure of Ear by using charts and model.</p> <p>1.4 To prepare the health chart schedule for adults and geriatric person.</p>

	1.5 To calculate the values of carbohydrates, proteins and fats in the form of calories for adults. Course Outcome: CO5 Teaching Hours : 15 hrs Marks: 20 (PE+ Final)
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REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication
1	Best and Taylor's Physiological Basis of Medical Practice	Best & Taylor's: William & Wilkins, Baltimore
2	Human Anatomy – Regional & Applied	Chaurasia; Part I, II, III, CBS Publishers & Distributors, New Delhi
3	Human Physiology	C.C. Chatterjee; Vols. I & II, Medical Allied Agency, Calcutta
4	Textbook of Medical Physiology	Guyton & Hall; WB Saunders Company
5	Exercise Physiology Laboratory Manual	Adams, Gene; W.C.B. McGraw Hill, New York: 1998

E-REFERENCES:

Website url:

7. <https://www.medicalnewstoday.com/articles/320444>
8. <https://www.wikipedia.org/>
9. <https://microbiologyinfo.com/>
10. <https://www.authorstream.com>

HEMATOLOGY LAB I

PROGRAMME: B. Sc. Medical Lab Technology							
COURSE CODE: BMT 204			COURSE TITLE: HEMATOLOGY LAB I				
COMPULSORY / OPTIONAL: COMPULSORY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEEK	CREDIT	PE	FINAL	TOTAL
-	-	2	02	01	60	40	100

COURSE OUTCOMES

CO1	Understand the basic concept of haemoglobin estimation by various methods
CO2	Knowledge of various instruments and procedures related to hemocytometry
CO3	Mechanism and procedures for ESR estimation using different methods
CO4	Knowledge of procedures involved in routine examination of various body fluids
CO5	Concept and significance of bleeding time and clotting time determination

(CO= Course outcome Module wise)

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	<p>TITLE: Estimation of haemoglobin (Hb) by various methods</p> <p>1.1: Estimation of Hb by Sahlis method 1.2: Estimation of Hb by Cyabmethaemoglobin method 1.3: Estimation of Hb by oxyhaemoglobin method 1.4: Standardization of instruments for adaptation for Hb estimation</p> <p>Course Outcome: CO1 Teaching Hours : 12 hrs Marks: 20 (PE+FINAL)</p>
2	<p>TITLE: Estimation of cell counts by both visual as well as electronic method</p> <p>1.1: Estimation of white blood cells (leukocytes) counts 1.2: Estimation of red blood cells (erythrocytes) counts 1.3: Estimation of platelets (thrombocytes) counts 1.4: Experiments based on study of morphology of normal blood cells and their identification</p> <p>Course Outcome: CO2 Teaching Hours : 9 hrs Marks: 20 (PE+FINAL)</p>
3	<p>TITLE: Estimation of erythrocytes sedimentation rate (ESR) by various method</p> <p>1.1: Estimation of erythrocytes sedimentation rate (ESR) by Westergren's method 1.2: Estimation of erythrocytes sedimentation rate (ESR) by Wintrobe's method 1.3: Estimation of erythrocytes sedimentation rate (ESR) by Micro ESR method</p> <p>Course Outcome: CO3 Teaching Hours : 9 hrs Marks: 20(PE+FINAL)</p>
4	<p>TITLE: Experiment based on routine examination of biological fluids such as CSF</p> <p>1.1: Routine examination of urine 1.2: Routine examination of cerebrospinal fluid 1.3: Routine examination of semen</p> <p>Course Outcome: CO4 Teaching Hours : 06 hrs Marks: 20(PE+FINAL)</p>

5	<p>TITLE: Determination of bleeding time and clotting time by various methods</p> <p>1.1: Determination of bleeding time by Finger prick method</p> <p>1.2: Determination of bleeding time by Dukes method</p> <p>1.3 : Determination of bleeding time by Ivy's method</p> <p>1.4 : Determination of clotting time by Capillary tube method</p> <p>1.5: Determination of clotting time by Lee and White method</p> <p>Course Outcome: CO5 Teaching Hours : 6 hrs Marks: 20(PE+FINAL)</p>
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REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1	An introduction to medical laboratory technology	Baker et al., Seventh Edition, A Hodder Arnold Publication.	ISBN: 978-0750621908
2	Hematology for medical technologists	Charles F. Seiverd, Fifth Edition. Lea & Febiger, Philadelphia	ISBN: 978-0812108057
3	Technical hematology	Arthur Simmons, Third Edition, Lippincott Company.	ISBN: 0397504373
4	Pathology Practical Book	Harsh Mohan, Fifth Revised Edition, Jaypee Brothers.	<i>ISBN, 9789390595259</i>

E-REFERENCES:

- <https://www.slideshare.net/incisorsi/hemoglobin-estimation-127750554>
- <https://labpedia.net/erythrocyte-sedimentation-rate-esr-solution-and/>
- https://www.researchgate.net/publication/310591392_Red_Blood_Cell_Count_Brief_History_and_New_Method

CLINICAL CHEMISTRY LAB-I

PROGRAMME: B. Sc.(Medical Lab Technology)							
COURSE CODE: BMT 206			COURSE TITLE: CLINICAL CHEMISTRY LAB-I				
COMPULSORY / OPTIONAL: COMPULSORY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEEK	CREDIT	PE	FINAL	TOTAL
0	0	2	2 HRS	1	60	40	100

COURSE OUTCOMES

CO1	Describe the Fundamental concepts critical to Analytical procedures in Clinical Chemistry
CO2	Perform selected analytical procedures correctly yielding accurate and precise results
CO3	Distinguish between normal and abnormal Clinical Chemistry results
CO4	Describe basic skills of various Instruments like Centrifuge , Hot air oven etc
CO5	Discuss basic and contemporary techniques utilized in a Clinical Laboratory testing

(CO= Course outcome Module wise)

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	TITLE 1.1 Physical examination of Urine 1.2 Colour & Odour 1.3 Ph of Urine 1.4 Volume 1.5 Specific gravity of Urine Course Outcome: CO1 Teaching Hours : 3 hrs Marks: 20 (PE+FINAL)
2	TITLE 1.1 Chemical examination of Urine 1.2 Proteinuria 1.3 Ketonuria 1.4 Glucosuria 1.5 Bile salts Course Outcome: CO2 Teaching Hours : 3 hrs Marks: 20(PE+FINAL)
3	TITLE 1.1 Determination of Urea in Blood 1.2 Uric Acid 1.3 Protein 1.4 Creatinine Course Outcome: CO3 Teaching Hours : 3 hrs Marks: 20(PE+FINAL)
4	TITLE 1.1 Determination of Chlorides in Urine 1.2 Calcium 1.3 Phosphate 1.4 Ketones Course Outcome: CO4 Teaching Hours : 3 hrs Marks: 20(PE+FINAL)

5	<p>TITLE</p> <p>1.1 Determination of Microscopic structures of Urine</p> <p>1.2 Uric acid crystals</p> <p>1.3 Calcium oxalate crystals</p> <p>1.4 Cholesterol</p> <p>1.5 Triple Phosphate</p> <p>Course Outcome: CO5 Teaching Hours : 3 hrs Marks: 20(PE+FINAL)</p>
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REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication
1.	Practical Biochemistry for Medical Students	B. Raghu
2.	Pathology Practical Book	Harsh Mohan , Third Edition , Jaypee Brothers

E-REFERENCES:

1. <https://scholar.google.com/>
2. <https://swayam.gov.in/>

IT LAB

PROGRAMME: B. Sc. Medical Lab Technology							
COURSE CODE: BMT 208			COURSE TITLE: IT Lab				
COMPULSORY / OPTIONAL: COMPULSORY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEEK	CREDIT	PE	FINAL	TOTAL
	0	2	2	1	60	40	100

RATIONALE: Motto of teaching

COURSE OUTCOMES

CO1	Student should be acquainted with the Windows GUI, and some simple Windows-based applications.
CO2	Students should be able to work with Microsoft Word and be able to create and edit any document as per requirement.
CO3	Students should be able to work with Microsoft Excel and use its mathematical functions to create a spreadsheet.
CO4	Students should be able to create presentations using Microsoft PowerPoint.
CO5	Students should be familiar with the use of computer in the field of medicine, diagnostics and medical research.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	<p>TITLE Demo of Computer Start-up and Shutdown operations. Demo of Graphical and Command-based user interfaces. Acquaintance with Windows Desktop items.</p> <p>Windows folder hierarchy- Desktop, My Computer, My Documents, Recycle Bin, My Network Places, Windows Accessories- Notepad, Word pad, Paint, Calculator. Content creation and editing. Creating files in any of these applications and Saving it in the desired folder.</p> <p>Windows Explorer- Various file and folder operations- Copying, Moving, Renaming, Delating. Restoring files and folders from Recycle Bin.</p> <p>Course Outcome: CO1 Teaching Hours : 4 hrs Marks: (PE+FINAL)</p>
2	<p>TITLE Microsoft Word- Typing and Editing, Formatting text, Format Painter, Inserting Shapes, Graphics, Text, Equations to Word Document.</p> <p>Document Layout- Page Setup (Margins, Orientation, Page Size), Paragraph Formatting options (Text Alignment, Line Spacing, spacing between paragraphs, Tabs and Indents, Columns), Page breaks, Printing Documents, Converting to PDF.</p>

	Creating table, Row, Column and Cell operations, Mail Merge. Course Outcome: CO2 Teaching Hours : 4hrs Marks: (PE+FINAL)
3	TITLE Microsoft Excel- Table and Cell Formatting, Format Painter, Document Layout, Page Breaks, Printing Documents and Converting to PDF. Referencing Cells- Relative, Absolute, Local, 3-D, Remote, Working with Arithmetic Operators and Formula (Mathematical, Text and Date functions). Course Outcome: CO3 Teaching Hours : 8 hrs Marks: (PE+FINAL)
4	TITLE Logical Function AND(), OR(), NOT(), IF () and nested IF() Sorting and Filtering. Creating Charts- Column or Bar Chart, Pie Chart, Line Chart. Course Outcome: CO4 Teaching Hours : 4 hrs Marks: (PE+FINAL)
5	TITLE Microsoft PowerPoint- Creating a slide with text, graphics, animation, and other objects. Adding slides to a presentation, Using Animation Effects, Using Slide Transition. Course Outcome: CO5 Teaching Hours : 4 hrs Marks: (PE+FINAL)

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	“Fundamental of Computers”	V. Rajaraman, PHI	
2.	“Fundamental of Computers”	E. Balagurusamy, Mc Graw Hill	9780070141605

E-REFERENCES:

11. Jaiswal. S., “Information Technology Today”, Galgotia Publication.
12. Mehta. V. K., Deb. P. S., Rao. D “APPLICATION OF COMPUTER TECHNIQUES IN MEDICINE” PMID: [30510351](#)

ESSENTIAL OF ENVIRONMENTAL SCIENCES

PROGRAMME: B.Sc. Medical Lab Technology							
COURSE CODE: BMT 211			COURSE TITLE: Essential of Environmental Sciences				
COMPULSORY / OPTIONAL: AUDIT							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEEK	CREDIT	PE	FINAL	TOTAL
2	-	-	2	Non Credit	Q/A-100	-	100

RATIONALE: The main aim of environmental education at the B.Sc. level paramedical course is to succeed in making individuals and communities understand the complex nature of the natural and the built environments. Further, to acquire the knowledge, values, attitudes, and practical skills to participate in a responsible and effective way in anticipating and solving social problems, and in the management of the quality of the environment.

COURSE OUTCOMES: Students will be able to understand about

CO1	Importance of environmental science and concept of ecology, biogeochemical cycle, and food chain
CO2	Composition and function of various segment of environment
CO3	Water pollution, sources and types of pollutants, their toxic effect and water treatment process
CO4	Classification, toxic effects and control measures of air pollutants
CO5	brief introduction to Noise Pollution, Soil Pollution, and radiation pollution

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	TITLE: Multidisciplinary nature of environmental Science and Ecology 1.1 Definition, scope, importance and need for public awareness. 1.2 Ecosystem, basic structure of an ecosystem (abiotic and biotic components), 1.3 Biogeochemical cycles (carbon cycle, oxygen cycle, nitrogen cycle and hydrological cycle) 1.4 Food chain, food web, 1.5 Ecological pyramid. Course Outcome: CO1 Teaching Hours : 4 hrs
2	TITLE: Segments of environment 2.1 Atmosphere, 2.2 Structure of atmosphere 2.3 Lithosphere, soil profile and composition of soil 2.4 Hydrosphere 2.5 Biosphere Course Outcome: CO2 Teaching Hours : 4 hrs
3	TITLE: Water Pollution and waste water treatment 3.1 Water resources, 3.2 Sources of water pollution, various pollutants, their toxic effect

	3.3 Potability of water (Indian standard of drinking water) 3.4 primary and secondary waste water treatment 3.5 Trickling filter & Activated sludge process Course Outcome: CO3 Teaching Hours : 4 hrs
4	TITLE: Air Pollution 4.1 Introduction, classification of air pollutants, 4.2 Toxic effects of air pollutants, sources and their control measure 4.3 ESP, catalytic converter, and bag house filter, 4.4 Greenhouse effect, Global warming, 4.5 Ozone depletion. Course Outcome: CO4 Teaching Hours : 4 hrs
5	TITLE: A brief introduction to Noise Pollution, Soil Pollution, and radiation pollution 5.1 Noise Pollution (Introduction & sources) 5.2 Effects and control measures of noise pollution 5.3 Soil Pollution (Introduction & sources) 5.4 Effects and control measures of soil pollution 5.5 Radiation pollution Course Outcome: CO5 Teaching Hours : 4 hrs

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication
1.	Environmental chemistry	A. K. Dey
2.	A basic course in Environmental studies	Deswal & Deswal
3.	Environmental pollution and control	- C. S. Rao
4.	Essentials of ecology & environmental Sciences	S.V.S. Rana

E-REFERENCES:

1. Website : <http://cgwb.gov.in/Documents/WQ-standards.pdf>

SPORTS AND YOGA/NSS/NCC

PROGRAMME: DIPLOMA IN ENGINEERING							
COURSE CODE: BHS202			COURSE TITLE: SPORT & YOGA				
COMPULSORY / OPTIONAL: COMPULSORY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
		2	2	1	60	40	100

- Yoga

Meaning & Importance of Yoga, Elements of Yoga, Introduction - Asanas, Pranayama, Meditation & Yogic Kriyas, Yoga for concentration & related Asanas (Sukhasana; Tadasana; Padmasana & Shashankasana), Relaxation Techniques for improving concentration - Yog-nidra

- Yoga & Lifestyle

Asanas as preventive measures. Hypertension: Tadasana, Vajrasana, Pavan Muktasana, Ardha Chakrasana, Bhujangasana, Sharasana. Obesity: Procedure, Benefits & contraindications for Vajrasana, Hastasana, Trikonasana, Ardh Matsyendrasana. Back Pain: Tadasana, Ardh Matsyendrasana, Vakrasana, Shalabhasana, Bhujangasana. Diabetes: Procedure, Benefits & contraindications for Bhujangasana, Paschimottasana, Pavan Muktasana, Ardh Matsyendrasana. Asthema: Procedure, Benefits & contraindications for Sukhasana, Chakrasana, Gomukhasana, Parvatasana, Bhujangasana, Paschimottasana, Matsyasana.

- Training and Planning in Sports

Meaning of Training, Warming up and limbering down, Skill, Technique & Style, Meaning and Objectives of Planning. Tournament – Knock-Out, League/Round Robin & Combination.

- Psychology & Sports

Definition & Importance of Psychology in Physical Edu. & Sports

Define & Differentiate Between Growth & Development, Adolescent Problems & Their Management Emotion: Concept, Type & Controlling of emotions , Meaning, Concept & Types of Aggressions in Sports. Psychological benefits of exercise. Anxiety & Fear and its effects on Sports Performance. Motivation, its type & techniques. Understanding Stress & Coping Strategies.

- Doping

Meaning and Concept of Doping, Prohibited Substances & Methods, Side Effects of Prohibited Substances

- Sports Medicine

First Aid – Definition, Aims & Objectives. Sports injuries: Classification, Causes & Prevention. Management of Injuries: Soft Tissue Injuries and Bone & Joint Injuries

- Sports / Games

Following sub topics related to any one Game/Sport of choice of student out of: Athletics, Badminton, Basketball, Chess, Cricket, Kabaddi, Lawn Tennis, Swimming, Table Tennis, Volleyball, Yoga etc. History of the Game/Sport. Latest General Rules of the Game/Sport. Specifications of Play Fields and Related Sports Equipment. Important Tournaments and Venues. Sports Personalities. Proper Sports Gear and its Importance.

Sports Activity

References: 1. Modern Trends and Physical Education by Prof. Ajmer Singh. 2. Light On Yoga By B.K.S. Iyengar. 3. Health and Physical Education – NCERT (11th and 12th Classes)

BASIC WORKSHOP II (HEALTHCARE)

PROGRAMME: B. Sc. Medical Lab Technology							
COURSE CODE: BMT 218			COURSE TITLE: BASIC WORKSHOP II (HEALTHCARE)				
COMPULSORY / OPTIONAL: COMPULSORY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEEK	CREDIT	PE	FINAL	TOTAL
-	-	2	02	1	60	40	100

RATIONALE: Motto of teaching

COURSE OUTCOMES

CO1	Skill development for Good Laboratory Practices and Safety Regulations
CO2	Ability to adopt steps for quality assurance for error free reports
CO3	Precautions to be taken in emergency
CO4	Understand the techniques of spectrophotometry and chromatography
CO5	Able to manage the proper disposal of biomedical waste

(CO= Course outcome Module wise)

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	TITLE: Good Laboratory Practices and Safety Regulations 1.1: Good Laboratory Practices (GLP) 1.2 Safety Regulations, First Aid and Clinical Laboratory Records Course Outcome: CO1 Teaching Hours : 09 hrs Marks: 20 (PE+FINAL)
2	TITLE: Quality Assurance 1.1 Quality Assurance in Medical Laboratory Techniques Course Outcome: CO2 Teaching Hours : 06 hrs Marks: 20(PE+FINAL)
3	TITLE: Measures to be adopted in Emergency 1.1 Measures to be taken in Various Emergencies 1.2 Introduction to Ambulance Services Course Outcome: CO3 Teaching Hours : 06 hrs Marks: 20(PE+FINAL)
4	TITLE: Spectrophotometry & Chromatography 1.1 Basic concept of operating Procedure of UV-Spectrophotometer 1.2 Basic concept of operating Procedure of IR Spectrophotometers 1.3 Introduction to Various Chromatographic Techniques

	Course Outcome: CO4 20(PE+FINAL)	Teaching Hours : 09 hrs	Marks:
5	TITLE: Biomedical Waste Management and Hospital Management 1.1 Biomedical Waste Management (BMW) Guidelines 1.2 Basic concept of Hospital management and administration.	Course Outcome: CO5 20(PE+FINAL)	Teaching Hours : 09 hrs Marks:

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1	Medical Laboratory Technology: Methods and Interpretations	Ramnik Sood, Second Edition, Jaypee Publishers	ISBN : 9789351523338
2	Medical Laboratory Technology: A Procedure Manual for Routine Diagnostic Tests	Kanai L Mukherjee, Third Edition, Tata McGraw-Hill Publishing Company Limited	ISBN: 0070076631
3	An Introduction to Practical Biochemistry”,	David T Plummer, Third Edition, Tata McGraw-Hill Publishing Company Limited.	ISBN · 9780070994874

E-REFERENCES:

1. <https://mpcb.gov.in/waste-management/biomedical-waste>
2. <https://study.com/academy/lesson/quality-assurance-in-medical-laboratories.html>