UNIVERSITY POLYTECHNIC
BIT, MESRA

Course Structure
BMLT

w.e.f 2018 Batch

First Semester					
Course No	**Subject**	**Theory**	**Tutorial**	**Lab.**	**Credit**
BMT 1101	Human Anatomy & Physiology –I	3	1	0	4
BMT 1103	Chemistry for MLT	3	0	0	3
BMT 1105	Basics of Electrical & Electronics Engg.	3	0	0	3
BMT 1107	Basic Mathematics	3	0	0	3
BMT 1109	Communication Skill I	3	0	0	3
BMT 1102	Human Anatomy & Physiology Lab.-I	0	0	3	1.5
BMT 1104	Chemistry Lab.	0	0	3	1.5
BMT 1106	Basics of Electrical & Electronics Lab	0	0	3	1.5
BGA 1002/1004/1006/1008	PT & Games/NSS/NCC/CA	0	0	2	1
BMT 1012	Basic Workshop I (Health care)	0	0	3	1.5
	Periods per week	**15**	**1**	**14**	**-**
	Total Credit	**-**	**-**	**-**	**23**
	Total periods per week	**-**	**-**	**-**	**30**

Second Semester					
Course No	**Subject**	**Theory**	**Tutorial**	**Lab.**	**Credit**
BMT 2101	Human Anatomy & Physiology – II	3	0	0	3
BMT 2103	Hematology – I	3	0	0	3
BMT 2105	Clinical Chemistry – I	3	0	0	3
BMT 2107	Introduction to Computer Science	3	0	0	3
BMT 2109	Histology	3	0	0	3
BMT 2011	Communication Skill II	2	1	0	3
BMT 2102	Human Anatomy & Physiology Lab.-II	0	0	3	1.5
BMT 2104	Hematology Lab.-I	0	0	3	1.5
BMT 2106	Clinical Pathology Lab	0	0	3	1.5
BMT 2108	Fundamentals of Computer Lab.	0	0	2	1
BGA 2002/2004/2006/2008	PT & Games/NSS/NCC/CA	0	0	2	1
BMT 2010	Basic Workshop II (Health care)	0	0	3	1.5
	Periods per week	**17**	**01**	**16**	**-**
	Total Credit	**-**	**-**	**-**	**26**
	Total periods per week	**-**	**-**	**-**	**34**

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w.e.f 2018 Batch

Third Semester					
Course No.	**Subject**	**Theory**	**Tutorial**	**Lab.**	**Credit**
BMT 3101	Clinical Chemistry – II	3	1	0	4
BMT 3103	Biomedical Instrumentations	2	1	0	3
BMT 3105	Digital Electronics System	2	1	0	3
BMT 3107	Medical Microbiology	3	1	0	4
BMT 3109	Instrumentation & Measurement System	2	1	0	3
BMT 3011	Environmental Science	2	0	0	Non-Credit
BMT 3102	Clinical Chemistry Lab.-I	0	0	3	1.5
BMT 3104	Instrumentation Lab.	0	0	3	1.5
BMT 3106	Digital Electronics Lab	0	0	3	1.5
BMT 3108	Microbiology Lab.-I	0	0	3	1.5
BGA 3002/3004/3006/3008	PT & Games/NSS/NCC/CA	0	0	2	1
	Periods per week	14	5	14	-
	Total Credit	-	-	-	24
	Total periods per week	**-**	**-**	**-**	**33**
Fourth Semester					
Course No	**Subject**	**Theory**	**Tutorial**	**Lab.**	**Credit**
BMT 4101	Applied Microbiology	3	1	0	4
BMT 4003	Hematology – II	3	1	0	4
BMT 4105	Histopathology	3	1	0	4
	Elective-I	3	1	0	4
	Elective-II	3	1	0	4
BMT 4102	Microbiology Lab.-II	0	0	3	1.5
BMT 4004	Hematology Lab.-II	0	0	3	1.5
BMT 4106	Histopathology Lab I	0	0	3	1.5
	Elective Lab.	0	0	3	1.5
List of Elective					
BMT 4107	Parasitology & Cytology(Group-I)	3	1	0	4
BMT 4109	Immunopathology(Group-I)	3	1	0	4
BMT 4108	Parasitology Lab. (Group-I)	0	0	3	1.5
BMT 4111	Bio-signal Acquisition System(Group-II)	3	1	0	4
BMT 4113	Introduction to Microprocessor(Group-II)	3	1	0	4
BMT 4112	Microprocessor Lab. (Group-II)	0	0	3	1.5
	Periods per week	15	5	12	-
	Total Credit	-	-	-	26
	Total periods per week	**-**	**-**	**-**	**32**

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Course Structure
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w.e.f. 2018 Batch

Fifth Semester					
Course No.	**Subject**	**Theory**	**Tutorial**	**Lab.**	**Credit**
BMT 5101	Clinical Chemistry –III	3	1	0	4
BMT 5103	Forensic Medicine & Ethics	3	1	0	4
BMT 5105	Material Management	2	1	0	3
	Elective-I	3	1	0	4
	Elective-II	3	1	0	4
BMT 5102	Clinical Chemistry Lab.-II	0	1	2	2
	Elective Lab.	0	1	2	2
BMT 5106	Histopathology Lab.-II	0	1	2	2
BMT 5014	Bacteriology & Serology Lab.	0	1	2	2
List of Electives(One Group)					
BMT 5107	Serology & Virology(Group-I)	3	1	0	4
BMT 5015	Hematology & Blood Banking(Group-I)	3	1	0	4
BMT 5016	Hematology and Blood Banking Lab. (Group-I)	0	1	2	2
BMT 5111	Clinical Instrumentation(Group-II)	3	1	0	4
BMT 5113	Biomedical imaging Devices and Concept (Group-II)	3	1	0	4
BMT 5112	Clinical Instrumentation Lab. (Group-II)	0	1	2	2
	Periods per week	14	09	08	-
	Total Credit	-	-	-	27
	Total periods per week	**-**	**-**	**-**	**31**

Sixth Semester					
Course No	**Subject**	**Theory**	**Tutorial**	**Lab.**	**Credit**
BMT 6001	Clinical Internship Project	-	-	-	**16**
BMT 6002	Seminar	-	-	-	**3**

Semester Wise Credit	
First	**23**
Second	**26**
Third	**24**
Fourth	**26**
Fifth	**27**
Sixth	**19**
Total Credit	**145**

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BMLT (Semester-I)

SUBJECT: BMT 1101 HUMAN ANATOMY & PHYSIOLOGY – I

Objective:

The student will be able to:

- Explain basic principles of body chemistry.
- Identify and relate basic concepts of structures and functions of various organs.
- Describe the body plan and organization and homeostasis.

Module I: The anatomic and physiological organization of human body.
Cell organization and their function.
- Definition of Cell, tissues and various related terms
- Classification and Sub-division of human body
- Anatomical studies, Terms of location and position
- Organization of the body cells and tissues

Module II: Skeletal system, bones, joint and muscle.
- Definition skeleton
- Types, structure, growth and function.
- Division of Skeleton system- Appendicular & Axial
- Name of Bones and their parts
- Joint bones & Muscles

Module III: Body fluid, Blood morphology, chemistry & their function.
- Definition, properties and function of blood.
- Classification of blood, Morphology and chemistry of RBC, WBC and Platelets
- Blood grouping- ABO and Rh factors.
- Body fluids, Coagulant, Clotting factors, Haemopiesis and related terms.

Module IV: Respiratory system. Digestive system, structure of liver and their function.
- Introduction of respiratory system and related organs
- Respiratory portion- Longs, Pleural cavity etc.
- Anatomical studies and their function.
- Component of digestive system
- Anatomy of different organs of digestive system
- Alimentary tube and other related organs.

Module V: Cardiovascular system.
- Introduction of Heart & size, position, chambers etc.
- Anatomical of Heart, Blood vessels and blood supply
- Nerve vessels
- Pulmonary circulation- Name and position of Arteries & Veins

Books Recommended:

1. Best & Tayler: "Best and Taylor's Physiological Basis of Medical Practice," William & Wilkins: Baltimore.
2. Chaurasia: "Huaman Anatomy – Regional & Applied." Part I, II, III, CBS Publishers & Distributors, New Delhi.
3. C.C. Chatterjee: "Human Physiology," Vols. I & II, Medical Allied Agency, Calcutta.
4. Ganong: "Review of Medical Physiology," Prentice Hall International.
5. Guyton & Hall: "Textbook of Medical Physiology," WB Saunders Company.

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BMLT (Semester-I)

SUBJECT: BMT 1103 CHEMISTRY FOR MLT

Objective:

The curriculum of Chemistry for Medical Lab Technologist has been designed so that:

- The students may have better knowledge of chemistry as well as environmental awareness and safety, especially regarding the applications of the subject in the various fields of medical and allied industries.

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

- The fundamental knowledge of measurement of solutions,
- Concepts of acids, bases and buffer solution,
- Surface phenomena, liquids & Colloids
- Basic ideas & application of Radioactive elements
- Environmental Chemistry, pollutions, value awareness

Module I: Chemistry of measurement

Mole concept, Avogadro's number, atomic weight, molecular weight, Atomic mass unit (a.m.u.), Equivalent weight, Concentration terms (Molarity, Normality and Molality) with numerical

Module II: Radioactivity

Definition, Characteristics of Alpha, Beta and Gamma rays, Group displacement law, Radioactive decay, Half-life period, Radio Carbon dating, Nuclear fission and fusion, Applications of radioactive isotopes.

Module III: Concepts of acids and bases & Equilibrium

Various concepts of acids and bases (Arrhenius, Bronsted - Lowery and Lewis),

Law of chemical equilibrium, ionic product of water, pH (related numerical), solubility product, Ostwald's dilution law, common ion effect, Buffer solution.

Module IV: Surface phenomena & Colloids

Surface phenomena: Absorption, Adsorption, adsorbate, adsorbent, Difference between Absorption & Adsorption, types of adsorption (physiorption and chemiosorption).

Colloids: Introduction, types of colloidal system, Difference between colloid, suspension and true solution, and application of colloids (Tyndal effect, Brownian movement and Electrophoresis), emulsions.

Module V: Environmental awareness

Sources, effects, Control measures of Water, Air and Soil pollution, Value education, population explosion, Brief idea of pollution effects like Acid rain, Greenhouse effect, Role of CFC in Ozone layer depletion.

References:

1. Shashi Chawla, "A Text Book of Engineering Chemistry".
2. Bruce H Mahan, "University Chemistry".
3. O.P Agarwal,"Engineering Chemistry".
4. M M Uppal & S Bhatia, "Engineering Chemistry".
5. B. S. Bahal, Arun Bahal, G D Tuli, "Physical Chemistry.
6. Jain and Jain, Engineering Chemistry.
7. Kapoor, Physical Chemistry.
8. A.K Dey, Environmental Chemistry.

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BMLT (Semester-I)

SUBJECT: BMT 1105 BASICS OF ELECTRICAL & ELECTRONICS ENGINEERING

Objectives:

1. To know the basic idea of components and equipments used in electrical and electronics field.
2. Students can handle the equipments in Medical Laboratory.

Module I:

Electrical elements and their characteristics and DC circuits:

Resistance, Inductance, Capacitance, voltage source, current source.

DC circuits: Kirchoff's Law, series & parallel resistance and capacitance, Loop current & node voltage method.

Module II:

Electrical Machine and Safeties in electrical system:

Transformer, working principle of transformer, Auto transformer, Single and 3-ϕ transformer, DC & AC generator and motor.

Safeties in electrical system: Fuse, Circuit Breaker, Switches, Connectors, Relays and Earthing.

Introduction to SMPS, UPS, CFL and LED lights.

Module III:

AC single phase and three phase circuit:

Common signals & their wave form, RMS & Average value, form factor, phasor quantities, impedance, power, power factor, active, reactive and apparent power.

Introduction to AC three phase system, comparison between single phase and three phases.

Module IV:

Introduction to materials, semiconductor and Rectifiers:

Energy bands, Forbidden band, Conductor, Semiconductor, Insulator.

Intrinsic & Extrinsic, PN junction, Diode characteristic Zener diode, V-I characteristics, Applications of Zener diode.

Rectifiers: Half wave, Full wave centre-tapped, Bridge rectifier, Rectifier filter,

Module V:

Transistor and operational amplifier:

Fundamentals of Transistor, Transistor as an Amplifier, C.B, C.E & C.C configuration, load line & Q-point, Frequency response of amplifier.

Introduction to operational amplifier (OP-AMP), ideal characteristics of OP-AMP, CMRR, PIN diagram of IC-741, OP-AMP Configuration, OP-AMP Applications: Adder, Substractor, Integrator and Differentiator circuit.

References:

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

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BMLT (Semester-I)

SUBJECT: BMT 1107 BASIC MATHEMATICS

Objective:

1. Students will get proficient in technical details regarding calculations necessary for Laboratory Technology.
2. Students will be getting aware about the International System of Units used in different Laboratory settings.
3. Students will develop necessary skill in statistical techniques used in Laboratory technology.

Module I: Fundamentals of Pharmaceutical Calculations

Number and numerals, kinds of numbers, Common and decimal fractions, Ratio, proportion, and variation. Dimension analysis, significant figures, Estimation. Percentage of errors, Measurement of volume, Measurement of weight, Aliquot method of weighing and measuring, least weighable quantity method of weighing, logarithms.

Module II: International System of Units

Guidelines for correct use of the SI, Measure of length, Measure of volume, Measure of weight, Fundamental computation, Relation of the SI to other system of measurement.

Module III: Pharmaceutical Measurements: Density, specific gravity, and specific volume

Density, specific gravity, Density versus specific gravity, calculating the specific gravity of liquids, use of specific gravity in calculations of weight and volume, special consideration of specific gravity, calculating specific volume.

Measurement of volume, Measurement of weight, Aliquot method of weighing and measuring, Least weighable quantity method of weighing, Percentage of errors.

Module IV: Percentage, Ratio strength and other expressions of concentrations and Graphical methods

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.

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

Module V: Basic statistical methods

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

Text Book(s):

Pharmaceutical Calculations by Howard C. Ansel,Mitchell J Stoklosa.

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BMLT (Semester-I)

SUBJECT: BMT 1109 COMMUNICATION SKILL-I

Objective:
1. Introduction to various Communication skills
2. To improve Students Personality
3. To motivate students to work in challenging situation with positive attitude

Module I: Text (Poetry)
"*Keeping Quiet" :* Pablo Neruda
- Vocabulary - Understanding meaning of new words from text
- Comprehension – Responding to the questions from text
- Identifying parts of speech

Module II: Applied Grammar
- Verb-Subject Agreement
- Tenses

Module III: Common Errors
- Common Errors in the use of Articles and Prepositions.
- Conjunction, Affirmative/Negative/Assertive, remove too, use of article.

Module IV: Paragraph Writing
- Comprehension: Reading the passage and answering the questions related to the paragraph given.
- Précis writing: summarizing the paragraph.
- Note Making.
- Synonyms, Antonyms, Idioms and Phrases

Module V: Professional Writing
- Notice Writing
- Application writing : Job Application and Leave application
- Letter Writing: Formal (Business letters, Complaint letter).

The term work will consist of 2 assignments: The assignments should be written in A4 size note books (100 pages ruled)

List of Assignments:
a. Building of Vocabulary
b. Technical Jargons: Identify 10 technical words from the respective branches. Resource -- (Encyclopedia/Subject Books)
c. Grammar
   - Insert correct parts of speech in the sentences given by the teachers. (16 sentences--Two each, from the different parts of speech)
   - Punctuate the sentences given by the teachers. (10 sentences)

b. Conversational skills: Role plays
   - Students are going to perform the role on any 6 situations, by the teacher.

c. Writing Skills
   - Write any two events from the newspaper as it is
   - Write any two events on the situation given by the teacher.

Reference Books:

1. FLAMINGO- NCERT
2. P.C.Wren & H.Martin, High School English & Composition.
3. Oxford Dictionary- Oxford University

List of Laboratory Experiments:

1. Exercise for making the Sentences and their conversions.
2. Exercise for use of Parts of Speech.
3. Use of Vowels, Articles, Verbs.

List of Assignments/Tutorial:

1. Correct use of Tenses
2. Formation of words

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BMLT (Semester-I)

SUBJECT: BMT 1102 HUMAN ANATOMY AND PHYSIOLOGY LAB-I

Objective:

The student will be able to:

- Describe the body plan and organization and homeostasis.
- Explain basic principles of body chemistry.
- Identify and relate basic concepts of structures and functions of various organs.

List of Experiments:

1. To study the microscope and its related accessories.
2. To measure the own blood pressure by using sphygmomanometer.
3. To study the Human Skelton systems by using chart and models.
4. Demonstration of different bones of the Human Skelton systems.
5. Determination of Hemoglobin by Sahli's method.
6. Estimation of bleeding time of own blood sample.
7. Estimation of clotting time of own blood sample
8. Estimation of Salivary Amylase on different temperature.
9. To study and draw the structure of Respiratory system by using charts and model.
10. To study and draw the structure of Cardiovascular system by using charts and model.
11. To study and draw the structure of Digestive system by using charts and model.
12. Estimation of permanent slide of liver, kidney and pancreas.

References:

1. Kevin Patton, David Hill, "Essentials of Anatomy and Physiology Laboratory Manual",1st Edition.
2. N. Marieb, Laboratory manual for Anatomy & Physiology, 5th Edition.
3. Ian Patel and Muralitharan Nair, Fundamentals of Anatomy & Physiology.
4. Gerard J. Torotra, Robert J. Amitrano, Anatomy and Physiology: A Lab Manual.

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BMLT (Semester-I)

SUBJECT: BMT 1104 **CHEMISTRY LAB.**

LIST OF EXPERIMENTS

1. Standardize the given HCl solution with the help of N/20 sodium carbonate solution.
2. To determine the carbonate hardness of given water sample.
3. To determine the non-carbonate hardness of given water sample.
4. To determine the total hardness of given water sample by EDTA method.
5. To estimate pH of water sample by colorimetric method & pH meter.
6. To Estimate free chlorine in given water sample.
7. To estimate the amount of Mohr's salt present in the given solution using standard $KMnO_4$ solution.
8. To determine the alkalinity of given water sample.
9. Estimation of Barium as Barium Sulphate by Gravimetric Analysis.
10. Estimation of strength of Ag ion in the given $AgNO_3$ solution by gravimetric analysis.
11. To separate the various pigments in the extract of green grass by TLC.
12. To determine the value of rate constant (K) for the hydrolysis of ethyl acetate catalyzed by hydrochloric acid.
13. To determine the λ max for the given solution using colorimeter.
14. To determine the concentration of the given unknown solution of $KMnO_4$ by colorimeter.
15. To determine the Fe^{3+} concentration in the given water sample by colorimeter.
16. Qualitative analysis of unknown organic compounds for detection of elements and functional group.
17. Salt analysis for one acid and one basic radical (Salt 1).
18. Salt analysis for one acid and one basic radical (Salt 2).
19. Salt analysis for two acid and two basic radical (Mixture 1).
20. Salt analysis for two acid and two basic radical (Mixture 2).

References:

1. Shashi Chawla, Essential of Experimental Engineering Chemistry.
2. S. K. Bhasin & Sudha Rani, Laboratory Manual on Engineering Chemistry.

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BMLT (Semester-I)

SUBJECT: BMT 1106 BASICS OF ELECTRICAL & ELECTRONICS LAB.

LIST OF EXPERIMENTS

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).

References:

1. Shashi Chawla, Essential of Experimental Engineering Chemistry.
2. S.K Bhasin & Sudha Rani.Laboratory Manual on Engineering Chemistry.

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BMLT (Semester-I)

SUBJECT: BMT 1012 BASIC WORKSHOP I (HEALTH CARE)

- Introduction to Common Laboratory Glass Wares
- Introduction to basic Laboratory Equipments
- Basic Laboratory Safety
- Code of Conduct for Medical Laboratory Personnel
- Labelling of Hazardous Reagents or Chemicals
- Recording of Physiological Parameters - body temperature, pulse and respiration etc.
- Auscultation for Heart Sounds
- Artificial Respiration
- Determination of respiratory Parameters- Vital capacity, Tidal Volume etc.
- Introduction to techniques of Phlebotomy (Specimen Collection)
- Separation of Serum & Plasma

References:

1. Ramnik Sood, "Medical Laboratory Technology: Methods and Interpretations", Jaypee Publishers.
2. Kanai L Mukherjee, "Medical Laboratory Technology: A Procedure Manual for Routine Diagnostic Tests" Tata McGraw-Hill Publishing Company Limited.
3. David T Plummer, "An Introduction to Practical Biochemistry", Tata McGraw-Hill Publishing Company Limited.

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BMLT (Semester-II)

SUBEJCT: BMT 2101 HUMAN ANATOMY & PHYSIOLOGY – II

Objective:

The student will be able to:

- Explain basic principles of body chemistry.
- Identify and relate basic concepts of structures and functions of various organs.
- Describe the body plan and organization and homeostasis.

Module I: Urinary System

- Introduction and anatomy of Urinary system.
- Role of Kidney, Ureters, Urinary bladder and Urethra
- General Characteristics of Urine
- Composition of Urine, Abnormal constituents and related diseases.

Module II: Nervous System

- Introduction, Classification and functions of Nervous system.
- Role of Neuron- Conduction of impulse and factors that affect it.
- Synapse- Classification, transmission etc.
- Anatomy and functions of Brain
- Role of Cerebrospinal fluids (CSF)- Composition, circulation and function.
- Autonomic Nervous system, types and their function.

Module III: Endocrine and Exocrine glands and their functions and Lymphatic System

- Role and function of Endocrine and Exocrine glands
- Function of hormones and local hormones
- Anatomy of Lymphatic system and their role.
- Function of Lymph, Spleen and lymphatic ducts.

Module IV: Reproductive System

- Introduction to reproductive system
- Male reproductive system- Primary and Accessory organs and their functions.
- Role of hormones, spermatogenesis, fertilization and related terms
- Anatomy of female reproductive system and their functions.
- The Ovarian cycle, menstrual cycle, Ovulation, Pregnancy test and related terms.
- Fertility control, Infertility, combined infertility etc.

Module V: Sense organs; Eye, Ear, Nose, Tongue and Skin - Structure & their functions.

Nutrition - Carbohydrate, Protein, Fats etc.

- Structure and function of Eye
- Anatomical studies and role of various organs of Eye
- Structure and function of Ear
- Anatomical studies and mechanism of hearing
- Anatomical structure and functions of Nose, Tongue and skins etc
- Essentiality of Carbohydrate, Protein, Fats etc.

References:

1. Best & Tayler: "Best and Taylor's Physiological Basis of Medical Practice," William & Wilkins: Baltimore.
2. Chaurasia: "Human Anatomy – Regional & Applied." Part I, II, III, CBS Publishers & Distributors, New Delhi.
3. C.C. Chatterjee: "Human Physiology," Vols. I & II, Medical Allied Agency, Calcutta.
4. Ganong: "Review of Medical Physiology," Prentice Hall International.
5. Guyton & Hall: "Textbook of Medical Physiology," WB Saunders Company.
6. McNaught & Callander: "Illustrated Physiology," Churchill Livingstone.

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BMLT (Semester-II)

SUJECT: BMT 2103 HEMATOLOGY - I

Objective:

The students will be able to:

- Understand the process of hematopoiesis.
- Different types of normal blood cells and give the identifying characteristics and role of each.
- Discuss how the hemoglobin, hematocrit, erythrocyte to indices, and ESR are used to diagnose.
- Understand how specimens are collected.
- Obtain specimens for specialty tests as covered in this chapter.
- Distinguish between normal and abnormal test results.
- Discuss how the clinical science of hematology and the complete blood count (CBC) are used in the diagnosis and treatment of disease.

Module I: **Introduction to hematology**,
Formation of blood, composition and functions of blood. Morphology of normal blood cells and their identification.

Module II: **Anticoagulants:**
Various anticoagulants and their uses, mode of action of anticoagulants, merits and demerits.

Module III: **Physiological variations:** Hb , PCV, TLC, Platelets

Module IV: **Haemoglobinometry:** various methods of estimation of Hb,
Haemocytometry: procedures of cell counts, visual as well as electronic, red cell, leucocytes and platelets counts.

Module V: **Erythrocytes sedimentation rate (ESR):** Phases of ESR, factors influencing ESR and various methods of ESR estimation.
Routine examination: urine, semen and biological fluids such as CSF etc.

References:

1. Baker et al, "An introduction to medical laboratory technology", A Hodder Arnold Publication.
2. Charles F. Seiverd, "Hematology for medical technologists", Lea & Febiger, Philadelphia.
3. Arthur Simmons, "Technical hematology", Lippincott Company.
4. Harsh Mohan, Pathology Practical Book, Third Edition, Jaypee Brothers.

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BMLT (Semester-II)

SUBJECT: BMT 2105 CLINICAL CHEMISTRY- I

Objective:

The aim is to understand:

1. the fundamentals of biochemical principles, such as the structure and functions of biomolecules,
2. metabolic pathways and
3. regulation of biological/biochemical processes.

Module I:

Introduction to biochemistry: Bio constituents, Metabolism, Biochemistry of cell membrane**:** Fluid mosaic model of cell membrane, Extrinsic and intrinsic protein, functions of cell membrane. Bioenergetics and biological oxidation: Application of Thermodynamics in Biological Reactions, Biological Oxidation Reduction, Substrate Level Phosphorylation, Energy Rich Compounds.

Module II:

Enzymes: Clinical Nature of the Enzymes, Properties of Enzymes, Factors affecting Enzyme Activity, Enzymes Inhibition, Mechanism of Enzyme Action, Nomenclature and Classification of Enzymes, Isoenzymes, Multienzyme Complex, Diagnostic applications of Enzymes, Therapeutic uses of Enzymes.

Module III:

Chemistry and Metabolism of Carbohydrates: carbohydrates of biological importance, Storage Carbohydrates: Glycogen Synthesis and breakdown, Glycoylsis, TCA Cycle, Gluconeogenesis, Glucose Tolerance, Blood Sugar Level, Glycosuria and Diabetes Mellitus, Disorder of Carbohydrate Metabolism.

Module IV:

Chemistry and Metabolism of Lipids:

Lipids of biological importance, Derived lipid, Sterols, Bile acids, oxidation of fatty acids, ketolysis and ketogenesis, biosynthesis of fatty acids, Metabolism of phospholipids, Metabolism of Cholesterol, Disorder of lipid metabolism.

Module V:

Chemistry and Metabolism of Amino acids and Proteins: Characteristics, structure and function of Amino acid and Proteins, Biological Value and metabolism of Proteins. Chemistry and metabolism of Nucleic Acid. Structure and function of nucleic acid. Types of nucleic acid: DNA and RNA. Metabolism of nucleic acid.

References :

1. A.K. Murray, D.K. Granner, P.A. Mayers and V.W. Rodwell," Harper's Review in Biochemistry". Prentice Hall of India Ltd., New Delhi.
2. Lehninger: "Biochemistry," 3rd ed., Worth, CBS Publisher &Distributors .
3. Satya Narayan:" Biochemistry," Book & Allied (P) Ltd., Reprint .

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BMLT (Semester-II)

SUBJECT: BMT 2107 INTRODUCTION TO COMPUTER SCIENCE

Objective:
The subject aims to provide the student with:

1. Introduction to computers, anatomy of computers, and different applications of computers.
2. It gives them knowledge about MS-Office application and Internet.
3. It provides the insights to importance of communication and its types.
4. Students will understand and use different forms of communication.
5. The additional outcome would be learning the use of laboratory software.

Module-I:
Introduction to computers: Introduction of computers, History of computers, Characteristics of computer, Generation of computers, Types of computers.

Module-II:
Components of Computer System: Central Processing Unit (CPU), input/output Devices, computer Memory: primary and secondary memory, magnetic and optical storage devices, Concepts of Hardware and Software.

Module-III:
Computer Software: Starting up the Computer: Software Types, System Software, Applications Software, Software Creation and Programming Languages, The Operating System, User Interface, Loader and Linker, Compiler, Assembler and Interpreter, Types of Operating Systems.

Module-IV:
Introduction to database: Definition, components, advantages. Ms-Access: Starting access, opening a database file, introduction to database windows, saving and closing a database file, using the help menu. Working with databases: using the database wizard, working with datasheets, moving between records and files, updating records, selecting rows and columns, changing column width, saving and exiting a datasheet.

Module-V:
Computer communication:
Computer networks, Types of networks: LAN, WAN, MAN.
Internet: Introduction to internet and its application/services.
Service on Internet: WWW and web-sites, web browser, Electronic mails.

References:

1. Vikash Gupta, “Comdex Computer Course Kit”, Dreamtech
2. V. Rajaraman, “Fundamental of Computers”,PHI
3. S. Jain, “ O’-Level Information Technology”, BPB

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BMLT (Semester-II)

SUBJECT: BMT 2109 HISTOLOGY

Objective:

The student will be able to:

- Identify the basic structure of cells, tissues and organs and describe their contribution to normal function.
- Explain the relationship between histology and the pathogenesis of disease.
- Interpret light- and electron-microscopic histologic images and identify the tissue source and structures.

Module I: Introduction to histology significance, microtechnique

Module II: Fixation

Methods of Fixation: Physical methods, chemical methods, General properties of fixatives, classification of fixatives, choice of fixative.

Module III: Mounting

Mounting: Processing, Keeping sections on slides, Various mounting media, treatments before staining.

Module IV: Dyes & Stains

Dyes: Classification and nomenclature, histological staining, metachromasis and metachromatic dyes.

Staining blood and other cell suspension, connective tissue, nucleic acids, organic functional groups and protein histochemistry

Carbohydrate and amyloid special staining procedures and lipid staining.

Principles of metal impregnation techniques, Demonstration and identification of minerals and pigments.

Module V: Histological Studies of Various System:

Histological studies of circulatory system, alimentary system, digestive system, respiratory system, urinary system, reproductive system, lymphatic and neurosensory system

References

1. **:** Kiernan JA: Histological and Histochemical Methods Theory and Practice., 3rd edn, Butter worth & Heinemann Publication.
2. Harsh Mohan, Pathology Practical Book, Third Edition, Jaypee Brothers.

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BMLT (Semester-II)

SUBJECT: BMT 2011 COMMUNICATION SKILL II

Objective:

- Introduction to various Communication skills
- To improve Students Personality
- To motivate students to work in challenging situation with positive attitude

Module I: Introduction to communication:
1.1 The concept of Communication.
1.2 Definition of communication process.
1.3 Characteristics of communication

Module II: Types of communication
Formal- informal and Verbal-Non-Verbal Communication

Module III: Principals of effective communication:
3.1 Definition of effective communication
3.2 Communication barriers & how to overcome them.

Module IV: Soft Skills
5.1 Definition of soft skills
5.2 Importance of soft skills

Module V: **Presentation Skills**
5.1 Structuring a presentation
5.2 Types and techniques of delivering presentation.
5.3 Body language during presentation

Assignments:
1. Communication Situations (List of 5 Communication situations stating the type of communication
3. Barriers That Hinder a Particular Communication Situation. (State the type of barrier, and how to overcome them).

Reference:

Effective Technical Communication: M.A. Rizvi (2007), Tata McGraw-Hill.

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BMLT (Semester-II)

SUBJECT: BMT 2102 HUMAN ANATOMY & PHYSIOLOGY LAB– II

List of Experiments:

1 To determine the pH, Specific gravity and general characteristics of urine.
2 Microscopic examination of urine sample (Calcium oxalate and Ammonium urate crystals).
3 To study and draw the structure of Nervous system by using charts and model.
4 To study and draw the structure of various glands by using charts and model.
5 To study and draw the structure of Reproductive system by using charts and model.
6 To study and draw the structure of Lymphatic system by using charts and model.
7 To study and draw the structure of Skin and its various layers by using charts and model.
8 To study and draw the structure of Eye by using charts and model.
9 To study and draw the structure of Ear by using charts and model.
10 To prepare the health Chart schedule for Adults and geriatric person.
11 To calculate the values of Carbohydrates, proteins and fats for adults.

References:

1. Essentials of Anatomy and Physiology Laboratory Manual 1st Edition, Kevin Patton, David Hill.
2. Laboratory manual for Anatomy & Physiology, 5th Edition N. Marieb.
3. Fundamentals of Anatomy & Physiology, Ian Patel and Muralitharan Nair.
4. Anatomy and Physiology: A Lab Manual by Gerard J. Torotra, Robert J. Amitrano.

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BMLT (Semester-II)

SUBJECT: BMT 2104 HEMATOLOGY LABORATORY I

List of Experiments

1. Estimation of Hb by various methods.
2. Standardization of instruments for adaptation for Hb estimation.
3. Estimation of cell counts by both visual as well as electronic method
4. Estimation of white blood cells (leukocytes) counts
5. Estimation of red blood cells (erythroocytes) counts
6. Estimation of platelets (thrombocytes) counts\
7. Experiments based on study of morphology of normal blood cells and their identification
8. Estimation of erythrocytes sedimentation rate (ESR) by Westergren's method.
9. Estimation of erythrocytes sedimentation rate (ESR) by Wintrobe's method.
10. Estimation of erythrocytes sedimentation rate (ESR) by Micro ESR method.
11. Experiment based on routine examination of biological fluids such as CSF
12. Determination of bleeding time by various methods
13. Determination of clotting time by various methods

References:

1. Baker et al: An introduction to medical laboratory technology.
2. Charles F. Seiverd: Hematology for medical technologists
3. Arthur Simmons: Technical hematology
4. Harsh Mohan,Pathology Practical Book,Third Edition, Jaypee Brothers

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BMLT (Semester-II)

SUBJECT: BMT 2106 CLINICAL PATHOLOGY LAB.

List of Experiments:

1. Physical examination of Urine.
2. Chemical examination of Urine for Proteinuria
3. Chemical examination of Urine for Ketonuria
4. Chemical examination of Urine for Glucosuria
5. Chemical examination of Urine for Bile Salts
6. Chemical examination of Urine for Urobilinogen
7. Physical examination of stool
8. Chemical examination of stool
9. Microscopic examination of stool
10. Physical examination of Semen
11. Chemical examination of Semen
12. Determination of urea in Blood.
13. Estimation of chloride in Urine.
14. Estimation of Total Nitrogen in Urine.
15. Estimation of Ammonium salts of Urine.
16. Determination of Microscopic structures of Urine.

References:

1. Practical Biochemistry for Medical Students - B. Raghu
2. Manaul of Practical Biochemistry – K.P Sinha
3. Practical Clinical Biochemistry
4. Practical Pathology - NC Dey, D.Sinha
5. Harsh Mohan, Pathology Practical Book, Third Edition, Jaypee Brothers

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BMLT (Semester-II)

SUBJECT: BMT 2108 FUNDAMENTALS OF COMPUTER LAB

Operating system -Windows

1. Create a new folder and do the following:
    1. Create a new folder
    2. Rename folder
    3. Move folder
    4. Copy folder.
    5. Delete folder
2. Implement the various well known features of Windows operating system such as Notepad, WordPad, Paint, System tools, Entertainment etc.
3. Implement various display properties.
4. Explore the taskbar of Windows.
5. Set the wall paper and screen saver.
6. Set the data/time.
7. Recycle bin

Word Processing -MS-Word

1. Create a document and
    a. Put Bullets and Numbers
    b. Apply various Font parameters.
    c. Apply Left, Right, and Centre alignments.
    d. Apply hyperlinks
    e. Insert pictures
    f. Insert ClipArt
    g. Show the use of WordArt
    h. Add Borders and Shading
    i. Show the use of Find and Replace.
    j. Apply header/footers
2. Create any document and show the use of File versions.
3. Create any document and show the difference between paste and paste special.
4. Create a document to show the use of Washout/Watermark.
5. Implement the concept of mail merge.
6. Implement the concept of macros.
7. Implement the concept of importing a file/document.
8. Implement the concept of merging the documents.
9. Crate a student table and do the following:
    a. Insert new row and fill data
    b. Delete any existing row
    c. Resize rows and columns
    d. Apply border and shading
    e. Apply merging/splitting of cells
    f. Apply sort
    g. Apply various arithmetic and logical formulas.

Create your resume using General Templates.

Spreadsheet-MS-Excel

1. Compute the division of each and every student of a class.
2. Generation of Electricity Bill
3. Generation of Telephone Bill

4. Generation of Salary statement of an employee
5. Generation of Mark Sheet of a student.
6. To compute mean/median/mode.
7. Generate graph to show the production of goods in a company during the last five years.
8. Compare the cost, overheads and sales figures of a company for last three years through appropriate chart.
9. Create any worksheet and apply various mathematical, statistical and financial functions.
10. Generate the following worksheet

Roll No.	Marks
2050	67
2051	49
2052	40
2053	74
2054	61
2055	57

and do the following:

a. Crate chart of the marks.
b. Compute sum of marks using autosum, autocalculate and sum function.
c. Compute average of marks.
d. Show pass or fail if marks are above 50 or less than 50
e. Put header and footer in the spread sheet.

Presentation software- MS-PowerPoint

1. Make a presentation of College Education System using
    a. Blank Presentation
    b. From Design Template
    c. From Auto Content Wizard
2. Make a presentation on "Wild Life" and apply the following:
    a. Add audio and video effects
    b. Apply various Color Schemes
    c. Apply various animation schemes.
    d. Apply Slide Show

Computer communication related practical

1. Connect the Internet; open any website of your choice and save the WebPages.
2. Search any topic related to your syllabi using any search engine and download the relevant material.
3. Send any greeting card to your friend.
4. Create your E-Mail ID on any free E-Mail Server.
5. Login through your E-Mail ID and do the following:
    a. Read your mail
    b. Compose a new Mail
    c. Send the Mail to one person
    d. Send the same Mail to various persons
    e. Forward the Mail
    f. Delete the Mail
    g. Send file as attachment
6. Surf Internet using Google to find information about your state
7. Surf Internet using Google to find Tourism information about your state
8. Surf Internet using Yahoo to find Hotels around your state

9. Surf Internet using Google to find information about educational institutes for teaching M.S in comp science in India
10. Surf Internet using Google to find information about Indian Cricket team

References:

1. Vikas Gupta, "Comdex Computer Course Kit", First, Dreamtech
2. Henry Lucas, "Information Technology for management", 7th, Tata Mc-Graw Hills
3. B.Ram, "Computer Fundamentals, Architecture and Organisation", 3rd Edition, New Age International Publisher

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BMLT (Semester-II)

SUBJECT: BMT 2010 BASIC WORKSHOP II (HEALTHCARE)

- Good Laboratory Practices (GLP)
- Safety Regulations, First Aid and Clinical Laboratory Records
- Quality Assurance in Medical Laboratory Techniques
- Measures to be taken in Various Emergencies
- Introduction to Ambulance Services
- Introduction to Various Chromatographic Techniques
- Basic concept of operating Procedure of Spectrophotometer- UV & IR-Spectrophotometers
- Biomedical Waste Management Guidelines 2018
- Basic concept of Hospital management and administration.

References:

1. Ramnik Sood, "Medical Laboratory Technology: Methods and Interpretations", Jaypee Publishers.
2. Kanai L Mukherjee, "Medical Laboratory Technology: A Procedure Manual for Routine Diagnostic Tests" Tata McGraw-Hill Publishing Company Limited.
3. David T Plummer, "An Introduction to Practical Biochemistry", Tata McGraw-Hill Publishing Company Limited.