III Semester

Course No.	Theory	Unit	Course No.	Laboratory	Unit
BMT 3001	Clinical Chemistry - II	1.0	BMT 3002	Clinical Chemistry Lab.-I	0.5
BMT 3003	Biomedical Instrumentations	1.0	BMT 3004	Instrumentation Lab.	0.5
BMT 3005	Digital Electronics System	1.0	BMT 3006	Digital Electronics Lab	0.5
BMT 3007	Medical Microbiology	1.0	BMT 3008	Microbiology Lab.-I	0.5
BMT 3009	Instrumentation & Measurement System	1.0	SCA 3001	PT & Games/CA	0.5

BMLT-3001: CLINICAL CHEMISTRY-II

Integration of Metabolism of Carbohydrates, Lipids and Proteins and Adaptation under Starvation

Metabolism of some Inorganic Constituents and water:
Sodium, Potassium and Chlorine, Calcium, Phosphorous, Iron, Magnesium, Iodine, Sulphur, Copper, Zinc, Manganese, Cobalt, Molybdenum, Fluorine, Water balance

Energy Metabolism:

General Biochemical Aspects of Diet
Vitamins & Conenzymes
Prostaglandins,

Chemistry and Functions of Hormones
Mode of actions of hormones, Chemical nature of hormones, Pituitary hormones, Thyroid and parathyroid hormones, Pancreatic hormones, Adrenal hormones, Gonadal hormones.

Porphyrins and Hemoglobins:

Porphyrins, Hemoglobins, Problems and adaptation at high altitudes.

Books Recommended:

1. Harper's Review in Biochemistry: A.K. Murroy, D.K. Granner, P.A. Mayers and V.W. Rodwell: Prentice Hall of India Ltd. New Delhi.
2. Fundamental of Clinical Chemistry R.W. Tietz (Ed.) W.B. Saunders Co., Philadelphia USA.
3. Clinical Chemistry (Principles and Techniques): R.J. Henry, D.C. Cannon, J.W. Winkelman: Harper & Row Publishers.
4. Text Book of Biochemistry by Agarwal's: Goel Publishing House.
5. A Text Book of Medicinal Biochemistry: R.L. Nath: New Age International Publishers.
6. Stryer: "Biochemistry," 4th ed., W.H Freeman & company, 1995 (Reprint 1999).
7. Mussay et al.: "Harpers Biochemistry," Prentice Hall International.
8. Marlin et al.: Harpers Biochemistry," 24th ed., Lange Medical Publications, 1996.
9. Lehninger: "Biochemistry," 3rd ed., Worth, CBS Publisher & Distributors 2000.
10. Conn & Stumpf: "Outline of Biochemistry," 5th ed., John Wiley & Sons, 2003.
11. Harrow & Mazur: "Text book of Biochemistry," W.B. Saunders, Philadelphia.
12. Jayaraman: "Laboratory Manual in Biochemistry," Wiley Eastern Ltd., New Delhi.
13. Satyanarayan: "Biochemistry," Book & Allied (P) Ltd., Reprint 2000.

Singh: "Practical manual of Biochemistry," 4th ed., CBS Publishers & Distributors, 2001.

BMT – 3003 : BIOMEDICAL INSTRUMENTATION

Introduction to Biomedical Instrumentation : Types of measurements, factors in making measurement, problem in measuring a living system.
(2)

Bio-signal equipment : ECG, EMG, EEG, Holter recorder, stores test and phonocardiography
(6)

Physiological Assist devices : pacemakers, defibrillators, nesthesia machine, mechanical ventilator, heart lung machine, nerve and muscle simulator.

Pathological / Laboratory equipment : Principle and operation of cell counters and biochemical analyzers, colorimeter, spectrophotometer, spectrofluorometer, pH meter, different types of ionic electrodes, Elisa reader, glucometers.
(1)

Biomedical Imaging devices : Principle and operation of X-ray machine. CT-scan machine, Ultrasound machine, MRI, Gamma Camera, SPECT, PET and endoscope.
(12)

Biomedical monitoring devices : Beside monitor, spirometer, pulse oximeter, sphygmomanometer and pulmonary function analyzer.
(6)

Safety and Troubleshooting Risk factor, safety and management of biomedical equipment, troubleshooting of common biomedical equipment and their rectification.
(4)

Books :

1. Introduction to Biomedical Technology by J.J. Karr & J.M. Brown
2. Handbook of Biomedical Instrumentation by R. S. Khandpur
3. Biomedical Instrumentation and Measurement by L. Crownwell et. Al.
4. Biomedical Instrumentation by M. Arumugham.

BMT-3005 : DIGITAL ELECTRONIC SYSTEMS

Module – 1
Introduction to Digital Systems, Number Systems, Binary Codes, Boolean Algebra – Basic definitions, Basic Theorems and properties of Boolean Algebra, Boolean functions, Canonical and standard forms.

Module – 2
Digital Logic Gates – AND, OR, NOT, XOR, NAND, NOR and XNOR, IC Digital Logic Families – RTL, DTL, TTL, MOS, CMOS and SSI, MSI, LSI, VLSI.

Module – 3
Simplification of Boolean functions – Types and their characteristics. Map method simplification for two, three and four variables, NAND and NOR implementation.

Module – 4
Combinational Logic Circuits design procedure, Design of Adder, Subtractor and Code Converter.

Module – 5
Combinational logic circuit with MSI and LSI – Binary Parallel Adder, Decimal adder, Magnitude comparator, Decoder Multiplexer, Encoder and De-multiplexer.

Module – 6
Introduction to Sequential Logic circuit, Flip-Flops – RS, JK T and D F/Fs. Triggering of Flip-Flops, Concept of Counters and Registers, Ripple counters, Synchronous Counters, Ring Counter and Shift Registers.

Module – 7
Introduction to Memory and Display Devices – their types and uses.

Books :

1. Digital logic and Computer Design by M. Moris Mano, TMH
2. Fundamentals of Digital logic with VHDL Design by Stephen Brown, Zvonko Vranesic, TMH

Digital Integrated Electronics by Herbert Taub and Donald Schilling McGraw Hill.

BMT-3007 : MEDICAL MICROBIOLOGY

1. **Introduction to microbiology:** History of microbiology, role of microbiology in health and diseases.
2. **Instruments**: Usage, care, handling and operation of various instruments including Microscope, Incubator, Refrigerator, Hot air oven, centrifuge, autoclave, water bath, Platinum loop, Vacuum pump, Electron Microscope, HEPA filter.
3. **Sterilization**: Principles and methods of sterilization, Physical, Chemical and Mechanical methods of sterilization, Biological Indicators, Validation of various techniques of sterilization, Sterilization of cotton, catgut, gauzes, solutions, media, milk, surgical and laboratory glass wares etc.
4. **Uses and mode of action of various disinfectants and antiseptics**.
5. **Bacteria**: Cells, flagella, fimbriae, spores, capsule, mesosome, ribosome, nucleoid, plasmid and transposable elements.
6. **General methods of classification of bacteria**: Autotropic and heterotropic bacteria, Eucaryotic and prokaryotic cells, archeobacteria and their evolutionary concepts.
7. **Procaryotes**: Cyanobacteria, phototropic bacteria, spirochaetes, spiral curved bacteria, gram negative aerobic rods and cocci , gram negative anaerobic rods, methane producing bacteria, gram positive cocci, endospore forming rods and cocci, actinomycetes and related organisms and rickettsias.
8. **Bacterial Growth**: Factors affecting growth, nutrition of bacteria, growth factors, respiration in bacteria, microbial photosynthesis, methods determining bacterial growth, Bacterial growth curve.
9. **Cultivation of microorganism**: Common culture and special media, anaerobic cultivation, isolation and inoculation, maintenance and preservation of cultures, separation of pure cultures from impure mixed cultures.
10. **Staining methods**: Gram staining, Acid fast staining, ZN staining, preparations of various stain reagents and principles of staining methods.
11. **Bacterial recombination**: General principles, conjugation, transformation and transduction.
12. **Fungi**: Morphology and cultivation, cell structure, characteristic of fungal divisions, symbiotic relationship of fungi.
13. **Virus**: Classification, general properties, cultivation and pathogenicity.
14. **Human pathogenic microbes:** Bacterial pathogens causing diseases in man with reference to mode of infection of tuberculosis, diphtheria, meningitis, pneumonia, whooping cough; protozoa causing diseases including *Entameoba histolytica* , *Trichomonas vaginalis* , *Leishmania* etc.

Books:

1. Introduction to Medical Microbiology by Anant Narayan.
2. Clinical Microbiology by Stokes & Ridgeway, Williams & Wilkins Publisher.
3. Pelczar , Chan & Kreig , Microbiology, 5th edn. , 1993.
4. Salle AJ, Fundamentals of Principles of Bacteriology**.**
5. Purohit, Microbiology,6th edn., 2002, Agrobios India

BMT – 3009 : INSTRUMENTATION AND MEASUREMENT SYSTEM

Introduction : Definition of measurement, Instrumentation, accuracy, sensitivity, precision resolution , types of errors, units and standards.

(3)

Analog Instruments : Moving coil and Moving iron instruments, Measurement of voltage, current and power.

(5)

Bridge and their application : DC Bridge – Wheatstone and Kelvin's bridge, AC Bridge – Maxwell's and Wein's bridge.

(5)

Oscilloscope : CRT, Block diagram of oscilloscope, voltage and frequency measurement using oscilloscope. Introduction to storage CRO

(9)

Transducers and their applications : Classification and selection of a transducer, Capacitive, inductive and resistive transducers, strain gauge, gauge factor, Photo electric. Piezoelectric transducer and Hall Effect transducers Measurement of temperature and pressure

(10)

Electronic Instruments : Introduction to Digital Voltmeter, transistorized voltmeter – cascade type and bridge type

(4)

Display Devices and Recorders : LED, LCD, Magnetic tape recorder and X-Y plotter.

(4)

Books :

1. Modern Electronics Instrumentation and Measurement – Techniques W.D. Cooper & A.D. Helfric, Pearson's education publication.

Electrical & Electronics Measurement and Instrumentation – A. K. Sawhney, Dhanpatrai and son's publications.

BMLT-3002 : CLINICAL CHEMISTRY LABORATORY-I

1. To determine the titrable acidity of Urine,
2. To determine glucose content in Urine,
3. To determine calcium content in Urine,
4. To determine chloride content in Urine,
5. To determine creatinine content in Urine,
6. To determine creatine content in Urine,
7. To determine glucose in blood,
8. To determine cholesterol in blood,
9. To determine creatinine content in blood,
10. To determine calcium content in blood,
11. To determine urea content in blood,
12. To determine urea content in blood urine,
13. Protein estimation by Lowry's Method,
14. Enzyme-linked immunosorbant assay (ELISA).

Books Recommended:

1. Varley's Practical Clinical Biochemistry, Heireman Medical Books Ltd. London.
2. Hawsk's Physiological Chemistry, Tata McGraw Hill Publishing Co.
3. Introduction to Practical Biochemistry by Plummer D.T. Tata McGraw Hill Publishing Co.
4. Clinical Chemistry in Diagnosis and treatment by E.J. Silva, P.R. Panral and Maryne: Edword Arnold P.G. Publisher Ltd.

Microanalysis in Medical Biochemistry: Wooton I.D.P. and Freeman H.: Churchill Livingston, Londan.

BMLT-3008 : MICROBIOLOGY LABORATORY - I

1. Introduction to use of laboratory instruments and safety precautions.
2. Collection, handling and storage of samples for diagnosis.
3. Uses of syringes, pipettes in microbiology laboratory.
4. Validation of autoclaves, hot air oven and other methods of sterilization etc.
5. Inoculation and incubation of liquid media.
6. Inoculation and incubation of solid media
7. Gram staining—Gram positive and gram negative
8. Acid fast staining
9. Motility test
10. Measurement of growth of microorganisms.
11. Conjugation in bacteria
12. Transformation in bacteria
13. Transduction in bacteria

Books:

2. Mackie & McCartney, Practical Medical Microbiology.
3. Robert Feurst & W.B. Saundeu, Lab Manual & Workbook for Microbiology in Health & Disease.
4. Gunasekharan , Laboratory Manual of Microbiology, New Age Publication