V Semester

Course No.	Theory	Unit	Course No.	Laboratory	Unit
BMT 5001	Clinical Chemistry -III	1.0	BMT 5002	Clinical Chemistry Lab.-II	0.5
BMT 5003	Forensic Medicine & Ethics	1.0	BMT 5004	Bacteriology Lab.	0.5
BMT 5005	Material Management	1.0	BMT 5006	Histopathology Lab.-II	0.5
BMT 5007	Serology & Virology Elective	1.0	BMT 5008	Serology & Virology Lab.	0.5
BMT 5009	Hemotology – III	1.0			
BMT 5011	or Clinical Instrumentation		BMT 5010	or Hematology Lab.- III Elective	0.5
BMT 5013	Biomedical imaging devices & concept Elective	1.0	BMT 5012	or Clinical Instrumentation Lab.-II	0.5

BMT - 5001 : CLINICAL CHEMISTRY-III

Detoxication Mechanisms:
Types of Reactions in Detoxication
Functions of organs and their Tests:
Functions of Liver:
Tests based on secretary function of liver, Tests based on conjugation function of liver, Tests based on Carbohydrate Metabolic function in liver, Tests based on Lipid Metabolic function in liver, Tests based on Protein Metabolic function in liver, Tests based on Iron Metabolic function in liver.
Renal Functional Test :
Hormonal regulation of kidney function, Tests on the function of the upper G.I.T., Tests on the function of the lower G.I.T., Thyroid Function Test,

Nutrition Dependent Disorders
Disorders related to Defects in Blood Coagulation
Antimetabolites
Antimetabolites in Cancer Therapy

Radioisotopes
Artificial Radioactive Isotopes, Tracer Technique, Application of Radioelements, Radiation Hazards and safety measure.

Inborn Errors
Errors in Carbohydrate, Protein, Lipids, Amino acids and Nucleic acid metabolism.
Biochemical aspects of some special diseases:
HIV, Parkinsorism, Alzheimers/Thallasamia etc.

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

BMT – 5003 : FORNSIC MEDICINE & ETHICS

1. Legal and Ethical Aspects of Medicine and Laboratory.
2. Forensic Medicine – Introduction.
3. Setup of Forensic Science Laboratory.
4. Forensic Examination of Biological Fluids, Steins, Trace Evidence and other Material.
5. Drug Dependence and Abuse.
6. Food Poison & Poisoning in general.
7. Medico legal Aspects of MTP.

Books

1. Hand Book of Forensic Medicine & Toxicology by Dr. P.V. Chandha, Jay Pee Brothers, 85-A, Karnala Nagar, Delhi – 110007.
2. Principle of Forensic Medicine by Apurba Nandy, New Central Book Agency (P) (Ltd.), 8/1, Chintamani Das Lane, Calcutta – 9.

BMT – 5007 : SEROLOGY AND VIROLOGY

1. **Immunity**-Various types of immunity, antigen, antibody and their various applications in diagnosis of diseases like diphtheria, tuberculosis etc.
2. **Antigen Antibody reactions**—Agglutination, precipitation, Flocculation, Neutralization, Complement fixation reaction, principles and classification of various types of hypersensitivity reactions.
3. **Serological and immunological techniques used in diagnosis** including Widal, VDRL, Brucella agglutination, Cold agglutination, RA Test, CRP Tests, Paul Bennel Test, Gel Diffusion Immunoelectrophoresis, Weil felix test etc.
4. **Serological Tests used in virology** like HA1, SRH, ELISA, RIA, IF, Immunoperoxidase, RPHA etc.
5. **Virology:** Introduction to medical virology**,** Classification of viruses, General characteristics of viruses including physical, chemical and biological properties; Collection, transport, processing and storage of samples for viral diagnosis; Inoculation of fertile eggs by various routes and techniques and their various incubation methods.

Books:

1. Timbery , Notes on Medical Virology(6 Vol), Churchill Livingstone Publisher.
2. Manual for rapid diagnosis in Virology, WHO Publisher

BMT – 5009 : HEMATOLOGY III

1. Definition and classification of anemia
2. Laboratory investigation procedures of megaloblastic anemia and iron deficiency anemia
3. Leukamia: definition and classification.
4. Cytochemical staining procedures in various haemopoietic disorders.
5. Laboratory techniques for assessing bleeding disorders.
6. Laboratory investigation of disseminated intravascular coagulation.
7. Mechanism of fibrinolysis: tests for fibrinolysis
8. Platelet functions and their interpretation.
9. Techniques available for cytogenic studies
10. Uses of radioisotopes in hematology., safety measures in handling radioisotopes

BOOKS**:**

1. **Baker et al: An introduction to medical laboratory technology.**
2. **Charles F. Seiverd: Hematology for medical technologists**
3. Arthur Simmons: Technical hematology
4. Thomson J: Blood coagulation and homeostasis

BMT – 5011 : CLINICAL INSTRUMENTATION

Clinical Cardiology: Electrocardiography, patient preparation for ECG recording, Electrode placement of electrodes, distinguishing the artifacts in ECG recording and their removal. (5)

Central monitoring system for intensive care unit, defibrillator and cardiac pacing, stress testing, Data Acquisition techniques for electrophysiology. (4)

Clinical electro-physiology : EEG, Different type of Machine and their electrical characteristics placement of electrodes, different artifacts in EEG and their removal, Montages for EEG, types of conducting paste for recording and their preparation, effects of different climatical conditions on recording of EEG. (8)

Electromyography, EMG, MNCV, SNCV, F.WAVE, DECREMENT, H.REFLEX, BLINK REFLEX, VEP, BAER, SSEP test electrodes setup of machine and recording. (5)

Clinical Psychiatrical Instrumentation – Electro shock therapy instrumentation, type of hazards and their preventive measures, introduction to polygraph for monitoring of EMG, EEG, HR, Pulse, Respiration Rate, Bio feed-back Instrument, Lie detector instrument. (8)

Normal and Ambulatory blood pressure measurement, different types of diathermy, Orthopedic diathermy-microwave, short wave diathermy ultrasonic diathermy, surgical diathermy and their different electrodes for cutting and coagulation. (7)

Dental arotors and different devices applied in dental clinics, Introduction to computerized opthalemic instruction, A-mode ultrasonography. (5)

Books :

1. Clinical Medicine, Praveen J. Kumar and Michaell Clark, “ELBS”.
2. Operating Manual of Neuroperfect, Medicaid Systems
3. Operating Manuals of ECG machine, TMT machine, Biofeedbacks machine, Diathermies machine.
4. Introduction to Biomedical Technology by J.J. Karr & J.M. Brown.
5. Handbook of Biomedical Instrumentation by R.S. Khandpur.
6. Biomedical Instrumentation and Measurement by L. Cromwell et.al.

BMT – 5013 : BIOMEDICAL IMAGING DEVICES & CONCEPT

Imaging concept of living system, Image quality and its control, Introduction to different types of contrast media in imaging procedures, indications of contrast reactions and its management. (8)

X-ray : Different types of X-ray machines; concept of dose selection, (mAS), mA, kVp, parameter that effect the quality of image, Different contrast used for x-ray and their methods of application. (5)

Cassettes, screen, speed of film, types of grids and their application, collimeter, dark room and the film processing, safety measure and prevention from radiation. (5)

Ultrasound : Different modes of operations of ultrasound, ultrasonic probes and their selection for different application, Gel, ultrasound gel automatic and semi automatic multiformat camera. (8)

Computed Tomography : Concept of C.T. Machines and their description, patient preparation and method of image capturing image storage devices, dry film concept, spiral and cardiac C.T. (6)

Magnetic Resonance Imaging : Concept of MRI, type of magnets, charging of liquid helium and charging of magnet, radio frequency interference and its prevention, installation of MRI, patient preparation and selection of coil for various studies, contrast application and its hazard management. (6)

Endoscopy : Different types of endoscopes, their principles and clinical applications. (4)

Books :

1. X-ray Diagnosis and Imaging by L.C. Gupta, Abhitabh Gupta; JAPEE Brothers Medical Publisher (P) Ltd., Delhi.
2. Ultrasound Physics & Instrumentation, Davind Hykes, Wayne R. Hedrick, Dale E.Starchman, Churchill Livingstone, N.Y.
3. Hand Book for X-ray Technician by Palmer, W.H.O. Publication.
4. Radiological Procedure by Chapman, Elsevier.
5. Handbook for Technicians : Darkroom Procedure by Palmar, W.H.O. Publication.

BMT : 5002 - CLINICAL CHEMISTRY LABORATORY-II

Analysis of Blood and Urine Enzymes:

1. Alkaline Phosphatase,
2. Acid Phosphatase,
3. Amylase,
4. Glutamate Oxaloacetate Transaminase (GOT).
5. Glutamate Pyrurate Transaminase (GPT).
6. Lipase,
7. Malate dyhydrogenase,
8. Nitrate and Nitrite reductase,
9. Ascorbic acid oxidase,
10. Catalase,
11. Peroxidase,
12. Lactate dehydrogenase,
13. Polyphenol oxidase,
14. Acetylcholine esterase,

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

BMT – 5004 : BACTERIOLOGY LABORATORY

1. Preparation of culture media.
2. Isolation of bacteria from various sources.
3. Steps in bacterial identification.
4. Biochemical reactions, tests & interpretation.
5. Cocci, Corynebacterium, Mycobacterium spp and their detailed identification.
6. Antibiotic sensitivity test.

Books:

1. Robert Feurst & W.B. Saundeu, Lab Manual & Workbook for Microbiology in Health & Disease.
2. Gunasekharan , Laboratory Manual of Microbiology, New Age Publication
3. Berger's Manual of Determinative bacteriology.

BMT – 5006 : HISTOPATHOLOGY LABORATORY II

1. Experiments based on processing of tissues for routine paraffin section and other methods of embedding like cry out method.
2. Staining of histological section for connective tissue, muscle fibers, glycogen, RNA, DNA, amyloid, lipid etc.
3. Interpretation of stained smear.
4. Demonstration of ferrous iron in tissue by Turnn blue reaction.
5. Experiments based on autopsy method and special test in post mortem examination by Lugol iodine and haemosiderin.
6. Studies on tissues requiring special treatment like eye ball

BOOKS:

1. Bancroft and Stevens: Theory and practice of histological techniques
2. Cullings: Cellular Pathology Techniques.

BMT – 5008 : SEROLOGY AND VIROLOGY LABORATORY

1. Demonstration of staining technique: Preparation of the following stains and demonstration of viral inclusion bodies: a) Seller's Negri Body demonstration. b) Glemsa stain for Herpes viral inclusion.
2. Preparation of reagents for serological tests: Phosphate buffer saline, Veronal buffered saline, Dextrose gelatin, Veronal buffer and Tris buffer.
3. Principles and performance of viral heamagglutination and heamagglutination inhibition test.
4. Demonstration of Haemadsorption test.
5. Collection, titration and preservation of gunnipig serum for complement.
6. Demonstration of Complement fixation test.
7. Demonstration of ELISA for Hbs Ag detection.
8. Different staining techniques used in virology
9. Use of embryonated eggs in clinical virology.
10. Principles of animal cell culture and their use in virology.
11. Demonstration of immunofluorescence test and Immunoperoxidase test.

Books:

1. Timbery , Notes on Medical Virology(6 Vol), Churchill Livingstone Publisher.
2. Manual for Rapid Diagnosis in Virology, WHO Publisher.
3. Robert Feurst & W.B. Saundeu, Lab Manual & Workbook for Microbiology in Health & Disease.

BMT – 5010 : HEMATOLOGY LABORATORY III

1. Laboratory investigation procedures of megaloblastic anemia and iron deficiency anemia
2. Laboratory techniques for assessing bleeding disorders
3. Laboratory investigation of disseminated intravascular coagulation
4. Experiment based on laboratory techniques available for cytogenic studies
5. Experiment based on test for fibrinolysis.
6. Laboratory investigation of hemolytic anemia
7. Experiment based on Cytochemical staining process
8. Estimation of platelets in blood

BOOKS:

1. Baker et al: An introduction to medical laboratory technology.
2. Charles F. Seiverd: Hematology for medical technologists
3. Arthur Simmons: Technical hematology
4. Thomson J: Blood coagulation and homeostasis.