

IV Semester

Course No.	Theory	Unit	Course No.	Laboratory	Unit
BMT 4001	Applied Microbiology	1.0	BMT 4002	Microbiology Lab.-II	0.5
BMT 4003	Hematology – II	1.0	BMT 4004	Hematology Lab.-II	0.5
BMT 4005	Histopathology	1.0	BMT 4006	Histopathology Lab.	0.5
BMT 4007	Parasitology & Cytology Elective	1.0	BMT 4008	Parasitology Lab	0.5
BMT 4009	Immunopathology	1.0	BMT 4012	or Elective Microprocessor Lab	0.5
BMT 4011	Or Bio-signal acquisition System Elective		SCA 4001	PT & Games/CA	0.5
BMT 4013	Intro. Microprocessor				

BMT - 4001 : APPLIED MICROBIOLOGY

- 1. Preservation of industrial microbes** and lyophilization.
- 2. Total and viable counts.**
- 3. Testing of disinfectants:** Rideal Walker test, Chick Martin test –their principles and methods
- 4. Immunology:** Preparation and standardization of vaccines and sera with special reference to BCG vaccine, polio vaccine, cholera vaccine, hepatitis vaccine, vaccine against mumps, measles and rubella, various toxoids, Immunization Schedule
- 5. Sterility Testing of I/V fluids.**
- 6. Lab diagnosis of common bacterial infections:** Pyogenic infections, Respiratory tract infections, Meningitis, Diphtheria, Whooping cough, Gas gangrene, Enteric fever, Diarrhoea infections, Cholera, Urinary tract infections, Tuberculosis, Leprosy, Plague, Typhus fever, Syphilis, Gonorrhoea etc.
- 7. Lab diagnosis of common fungal infections:** Superficial dermatophyte fungal infections, Candidiasis, Pulmonary infections, Eye and ear fungal infections.
- 8. Microbiology of food:** Microorganism found in food, primary sources of food poisoning, microbial examination of food, fungal toxin (mycotoxin) in food stuff, Preventive measures.
- 9. Microbiology of water:** Biological characteristic of water, microorganisms in water, microbiology of sewage, disinfections of water, treatment of waste water.
- 10. Microbiology of air:** Introduction, methods of purification of air, testing of laboratory air.
- 11. Microbes in Fermentation Technology:** General methods of production of enzymes, alcohols, organic acids, antibiotic with reference to cellulose, asparaginase, ethanol, citric acid, acetic acid, penicillin, streptomycin and tetracycline.
- 12. Brief introduction to advanced techniques in microbiology:** RIA, CCIEP, Co-agglutination, GLC, HPLC etc.

Books:

1. Pharmacopoeia of India, Published by Controller of Publication, New Delhi, 4th edn, 1996.
2. Berger's Manual of Determinative bacteriology,
3. Hugo & Russell, Pharmaceutical Microbiology, Blackwell Scientific Publication, Oxford.
4. Stansbury PF & Whitakar A., Principles of Fermentation Technology, Pergamon Press.
5. Pelczar , Chan & Kreig , Microbiology, 5th edn. , 1993.
6. Stainer RY, Ingraham , General Microbiology, Wheeler & Painter.

BMT – 4003 : HEMATOLOGY II

1. Bone marrow aspiration, composition and function.
2. Staining of bone marrow smears and preparation of histopathological sections
3. Hemoglobin, synthesis, composition, function, degradation.
4. Hemoglobin pigments and their measurement
5. Abnormal hemoglobin and their means of identification.
6. LF cell phenomenon and various methods of demonstration.
7. Haemostatic mechanism, theories of blood coagulation, physicochemical properties of coagulation factors, screening coagulation process, quantitative assay of coagulation factors.

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 - 4005 : HISTOPATHOLOGY

1. Cell injury, cell death, cell adaptations, intracellular accumulations and cell aging, acute and chronic inflammation, tissue repair, cell growth, fibrosis and wound healing, hemodynamic disorders, thrombosis, shock and neoplasia.
2. Histopathological techniques: Introduction to tissue preparation and processing including fixation, dehydration, clearing and embedding
3. Decalcification and other process for bone.
4. Aspects of microtomy, cryotomy and theories of staining principles inclusive of routine and special staining methods
5. Neuropathologic techniques
6. Electron microscope, working principles, components, allied techniques of electron microscopy.
7. Enzyme histochemistry, demonstration of phosphatase, dehydrogenase, oxidase, peroxidase etc.
8. Biopsy

BOOKS:

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

BMT – 4007 : PARASITOLOGY AND CYTOLOGY

1. Protozoa: General characteristics, classification of protozoa of medical importance
2. General characteristics and classification of medical helminthology.
3. Morphology and life cycle, pathogenicity and laboratory diagnosis of intestinal protozoa (amoeba –Giardia).
4. Morphology and life cycle, pathogenicity of various nematodes including Ascaris, Enterobius, Strongyloides, Ancylostome. Laboratory diagnosis of intestinal, tissue and blood nematode infection
5. Morphology and life cycle, pathogenicity of cestode including Tanenia, H. nana, D. latum. Laboratory diagnosis of cestode infections like hydatid, cysticercosis etc.
6. Morphology and life cycle, pathogenicity of various hemoflagellates including laboratory diagnosis of infections caused by leishmania and trypanosomes.
7. Laboratory methods of collection, preservation and processing of samples for parasites in blood, body fluids, stool, tissues and biopsy. Microscopic examination including preparation of stained and unstained matter for parasites, concentration techniques and identification of various parasites in collected samples.
8. Culture techniques of protozoa, helminthes, malaria, Entameoba histolytica.
9. Identification of different plasmodium species.
10. Important serological and immunological tests used in parasitology, Preparation and standardization of various parasitic antigens and antisera and their standardization.
11. Cervical cytology- Basis of detection of malignant and premalignant lesion.
12. Hormonal assessment in cytological techniques and sex chromatin and pregnancy test.
13. Aspiration cytology principles, indication and utility of techniques with special emphasis on role of cytotechniques in FNAC clinics.

BOOKS:

1. Gold Smith: Tropical medicines & Parasitology, John Wright Publisher.
2. Roltt: Essential Immunology, ELBS Publisher.
3. Ash & Oriel: Parasites: A Guide to lab procedures & identification, Am. Soc. Clinical Publisher.
4. Halls & Sohantz: Immunodiagnosis of parasitic diseases, Academic Press.
5. N.C.Dey: Parasitology

BMT - 4009 : IMMUNOPATHOLOGY

1. An overview on the theory of blood groups; ABO groups and Rhesus systems; Clinical significance of other blood groups;
2. Immunological aspects of blood transfusion;
3. Principles of blood grouping procedures and cross matching;
4. Blood collection, processing and storage;
5. Preparation of blood products; alloantibodies and complications of blood transfusion and infections
6. Antenatal serology and hemolytic disease of the new born.
7. Allergy
8. Rheumatological diseases and investigation.
9. Cancer immunology.
10. Tissue typing for kidney transplant

Books Recommended:

1. Remingtons Pharmaceutical Sciences, 17th edn.
2. Stainer and Graham: General Microbiology, Wheelers & Painter.
3. Pharmacopoeia of India: Vol. I & II, 4th edn., 1996, Controls of Publication, Govt. of India.
4. Vyas & Dixit: Pharmaceutical Biotechnology, 1st edn., CBS Publisher, 1996.
5. Carters. Ed.: Coopers & Gumm's Tutorial Pharmacy, 6th edn., CBS Publisher, 1972.

BMT – 4011 : BIO SIGNAL ACQUISITION SYSTEM

Generation of resting and action potential, polarization and depolarization, rhythmicity of cardiac potential.

(5)

Definition of signals and noise, types of bio-signals and its sources.

(6)

Biomedical Sensors and electrodes, Transducers for biomedical application, Recording problems and its remedy.

(9)

Different types of biomedical amplifiers and their principles of operation.

(5)

Radio telemetry system, Portable telemetry system, Land-line telemetry system, ECG and other physiological telemetry system.

(5)

Different types of biorecorders, construction and principle of operation, different types of cameras used for image recording systems and its processing.

(6)

Introduction to medical display systems, functional numerical display, central monitoring console, principles of operation.

(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. Cromwell et.al.

BMT - 4013 : INTRODUCTION TO MICROPROCESSOR

Module – 1

Block diagram of Digital Computer, Introduction to Intel 8085 microprocessor, Components of a microprocessor, Functional Block diagram of 8085, Pin description, Microcomputer system architecture, Concept of machine cycle and instruction cycle.

Module – 2

Classification of Instruction on the basis of number of byte, Types of operation, and Addressing modes, Instruction Description.

Module – 3

Introduction to Assembly Language Programming, Machine instruction, Assembler directives, Simple programming examples like addition subtraction, multiplication, division, data transfer and manipulation, code conversion, sorting etc.

Module – 4

Memory and I/O interfacing design, Input/Output Data Transfer techniques, Programmed I/O, DMA and interrupt I/O.

Module – 5

Interfacing Chips – PPI 8255, PIT 8253 and Programmable Keyboard / Display Interface 8279 with programming examples.

Module – 6

Introduction to Microcontroller, 8031/51 Microcontroller architecture, External memory interfacing. Instruction description, Programming examples based on medical applications.

Module – 7

Analog to Digital and Digital to Analog Converter, Interfacing of ADC0808, DAC0808 with microprocessor. The microprocessor in Biomedical Instrumentation, Computer analysis of the ECG, Clinical Chemistry laboratory, Patient Monitoring, Computer Axial Tomography.

Books :

1. Microprocessor Architecture, Programming and Application with 8085 by R. S. Gaonkar
2. Microprocessor and Interfacing, Programming & Hardware by Douglas Hall.
3. The 8086, 8088 Microprocessors by A. K. Gautam & A. R. Jaiswal. S. K. Kataria & Sons
4. Biomedical Instrumentation and Measurements by Leslie Cromwell, Fred J. Weibell

BMT 4002 : MICROBIOLOGY LABORATORY II

1. Sterility Test
2. Viable count and Total count.
3. Antibiotic assay.
4. Isolation of pure culture from a mixed culture by various methods.
5. Rideal Walker test
6. Coliform Test
7. Tools for preservation of microbes including slant agar, lyophilization etc.
8. Alcohol fermentation by yeast.
9. Isolation and characterization of hemolytic streptococci
10. Isolation and characterization of intestinal pathogens.
11. Isolation and identification of *Staphylococcus aureus*, *E. coli*, *Vibrio cholerae*.
12. Toxin antitoxin assay.

Books:

1. Oberhofer , Manual of Practical Medical Microbiology, Churchill & Livingstone Publisher.
2. Pharmacopoeia of India, Published by Controller of Publication, New Delhi, 4th edn, 1996.
3. Robert Feurst & W.B. Saundeu, Lab Manual & Workbook for Microbiology in Health & Disease.
4. Gunasekharan , Laboratory Manual of Microbiology, New Age Publication

BMT - 4004: HEMATOLOGY LABORATORY II

1. Determination of blood groups and Rh factors
2. Laboratory investigation of transfusion reaction
3. Staining of bone marrow smear and preparation of histopathological sections.
4. Experiments on identification and estimation of abnormal hemoglobin.
5. Quantitative assay of coagulation factors.
6. Various methods of demonstration of LF cell phenomenon.
7. Measurement of hemoglobin pigments

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 – 4006 : HISTOPATHOLOGY LABORATORY I

1. Microscopy, maintenance and application of micrometry.
2. Handling of fresh histological specimens (tissues), frozen sections of fresh and fixed tissues.
3. Reception of specimen, dispatch of records, record keeping coding the lesson of cases.
4. Demonstration of cytoplasmic constituents.
5. Lipid identification and demonstration.
6. Demonstration of decalcification of calcified tissue before sectioning
7. Experiments based on enzyme histochemistry with special reference of demonstration of various enzymes like phosphatase, dehydrogenase, oxidase and peroxidase

BOOKS:

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

BMT - 4008 : PARASITOLOGY LABORATORY

1. Introduction to operations of laboratory instruments and safety precautions.
2. Macroscopic examination of adult worms, cysts, tissues and processing of stool samples for routine examinations.
3. Saline and iodine preparations for protozoal cysts and trophozoites.
4. Concentration procedures of protozoal cysts and trophozoites
5. Concentration procedures for helminthic ova and cysts.
6. Examination, identification of ova and cysts of medical importance.
7. Processing for preparation of antigens for Cason's test and its interpretation.
8. Examination and processing of cysticercosis cysts.
9. Experiments based on serological and immunological tests used in parasitology
10. Differentiation of various mosquitoes, flies, worms etc.
11. Experiments based on electrophoretic techniques and gel diffusion
12. Preparation and standardization of various parasitic antigens and antisera.

Books:

1. Ash & Orinel: Parasites: A Guide to lab procedures & identification, Am. Soc. Clinical Publisher.
2. Halls & Sohanz: Immunodiagnosis of parasitic diseases, Academic Press.
3. Fleck & Moody: Diagnostic Techniques of medical parasitology, John Wright Publisher.

BMT – 4012 : MICROPROCESSOR LABORATORY

1. Study of 8085 Microprocessor Kit.
2. Write a program to add
 - (a) Two Hexadecimal Nos. 49H & 56H residing at location 2000H & 2001H and store the result at 2050H.
 - (b) Two Hexadecimal Nos. that generate a carry
 - (c) Two Double byte Nos.
3. WAP to add two Decimal Nos. 49D & 56D residing at location 2000H & 2001H. Subtract 62D from the result & store it in reg. B.
4. WAP to store two 8-bit no. in Reg B & E. Multiply these numbers & store the result in location 2501 & 2502.
5. WAP to separate the Hexadecimal number into two nibbles (MSB and LSB nibbles) and store the result in two different locations.
6. Write a program to sort a list of 10 number in descending order.
7. WAP to sort a list of 10 numbers in ascending order.
8. WAP to convert a BCD no residing at 2400H into binary no. & store it at 2401H.
9. WAP to convert a Binary no. residing at 2400H into a BCD no. and store it at 2500H.
10. WAP to sort even and odd parity Bytes in such a way that odd parity bytes appear first & even parity Bytes appear next. Keep a count of odd & even parity bytes in two successive locations.
11. 16-bytes are residing in locations from 2400H. Write a Program to transfer these bytes in locations starting from 2500H in such a way that first 8-bytes in the first Block should appear at last 8-location of the 2nd block & the last 8-bytes in the first block should appear at first 8-locations of the 2nd block.

