SunRise University
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Bachelor of Vocation (Medical laboratory technology)
B.Voc. (MLT) SyllabusYear 1 (Diploma)

FIRST SEMESTER

PAPERS CODE	PAPERS NAME	INTERNAL	EXTERNAL	TOTAL
BVMLT-101	Basics of Human Anatomy & Physiology-I	40	60	100
BVMLT-102	Basic Concepts of LAB Technology-1	40	60	100
BVMLT-103	Fundamentals of Microbiology	40	60	100
BVMLT-104	Phlebotomy & Bio Medical Waste Mgmt.	40	60	100
BVMLT-105	Fundamental of Computers	40	60	100
BVMLT-106	General English & Soft Skill	40	60	100
PRACTICAL				
BVMLT-107	Basics of Human Anatomy & Physiology-I Lab	60	40	100
BVMLT-108	Basic Concepts of LAB Technology-1 Lab	60	40	100
BVMLT-109	Fundamentals of Microbiology Lab	60	40	100
BVMLT-110	Phlebotomy & Bio Medical Waste Mgmt. Lab	60	40	100
BVMLT-111	Fundamental of Computers Lab	60	40	100
Total		**540**	**560**	**1100**

SECOND SEMESTER

PAPERS CODE	PAPERS NAME	INTERNAL	EXTERNAL	TOTAL
BVMLT-201	Human Anatomy & Physiology –II	40	60	100
BVMLT-202	Clinical pathology	40	60	100
BVMLT-203	Introduction to Haematology	40	60	100
BVMLT-204	Introduction to Bio chemistry	40	60	100
BVMLT-205	Advance Phlebotomy & Lab Ethics	40	60	100
BVMLT-206	Basics of Health Market & Economy	40	60	100
PRACTICAL				
BVMLT-207	Human Anatomy & Physiology –II Lab	60	40	100
BVMLT-208	Clinical pathology Lab	60	40	100
BVMLT-209	Introduction to Haematology Lab	60	40	100
BVMLT-210	Introduction to Bio chemistry Lab	60	40	100
BVMLT-211	Advance Phlebotomy & Lab Ethics Lab	60	40	100
Total		**540**	**560**	**1100**

Bachelor of Vocation (Medical laboratory technology)

B.Voc. (MLT) Syllabus Year-2 (Advanced Diploma)

THIRD SEMESTER

PAPERS CODE	PAPERS NAME	INTERNAL	EXTERNAL	TOTAL
BVMLT-301	Basic concepts of MLT-2	40	60	100
BVMLT-302	Routine Haematological Test	40	60	100
BVMLT-303	Microbial physiology metabolism	40	60	100
BVMLT-304	Blood Banking	40	60	100
BVMLT-305	Advance Computing Skills	40	60	100
BVMLT-306	Human Values & Profession al Ethics	40	60	100
PRACTICAL				
BVMLT-307	Basic concepts of MLT-2 Lab	60	40	100
BVMLT-308	Routine Haematological Test Lab	60	40	100
BVMLT-309	Microbial physiology metabolism Lab	60	40	100
BVMLT-310	Blood Banking Lab	60	40	100
BVMLT-311	Advance Computing Skills Lab	60	40	100
Total		**540**	**560**	**1100**

FOURTH SEMESTER

PAPERS CODE	PAPERS NAME	INTERNAL	EXTERNAL	TOTAL
BVMLT-401	Serology & Immunology	40	60	100
BVMLT-402	Bacteriology	40	60	100
BVMLT-403	Bio-Chemistry Metabolism	40	60	100
BVMLT-404	PathoGenic Microbiology	40	60	100
BVMLT-405	Genetics	40	60	100
BVMLT-406	Advance Communication &Soft Skills	40	60	100
PRACTICAL				
BVMLT-407	Serology & Immunology Lab	60	40	100
BVMLT-408	Bacteriology Lab	60	40	100
BVMLT-409	Bio-Chemistry Metabolism Lab	60	40	100
BVMLT-410	PathoGenic Microbiology Lab	60	40	100
BVMLT-411	Genetics Lab	60	40	100
Total		**540**	**560**	**1100**

Bachelor of Vocation (Medical laboratory technology)
B.Voc. (MLT) Syllabus Year- 3 (Degree)
FIFTH SEMESTER

PAPERS CODE	PAPERS NAME	INTERNAL	EXTERNAL	TOTAL
BVMLT-501	Histopathology & Cytology	40	60	100
BVMLT-502	Parasitological & Virology	40	60	100
BVMLT-503	Endocrinology, Tumor and cancer markers	40	60	100
BVMLT-504	Advance Bio-Chemical Testing Techniques	40	60	100
BVMLT-505	Digital Literacy & Account Literacy	40	60	100
BVMLT-506	Introduction to National Healthcare System	40	60	100
PRACTICAL				
BVMLT-507	Histopathology & Cytology Lab	60	40	100
BVMLT-508	Parasitological & Virology Lab	60	40	100
BVMLT-509	Endocrinology, Tumor and cancer markers Lab	60	40	100
BVMLT-510	Advance Bio-Chemical Testing Techniques Lab	60	40	100
BVMLT-511	Digital Literacy & Account Literacy Lab	60	40	100
Total		**540**	**560**	**1100**

SIXTH SEMESTER

PAPERS CODE	PAPERS NAME	INTERNAL	EXTERNAL	TOTAL
BVMLT-601	Food and Industrial Microbiology	40	60	100
BVMLT-602	Clinical Lab Operations & Management	40	60	100
PRACTICAL				
BVMLT-603	Food and Industrial Microbiology Lab	60	40	100
BVMLT-604	Clinical Lab Operations & Management Lab	60	40	100
BVMLT-605	Internship in hospital			300
BVMLT-606	Project Working Hospital			400
Total		**200**	**200**	**1100**

Year 1 (Diploma)

Semester I

BVMLT -101 Basics of Human Anatomy & Physiology-1

UNIT-1

Terminology and General Plan of the Body, Body Parts and Areas, Terms of Location and Position, Body Cavities and Their Membranes, Dorsal cavity, Ventral cavity, Planes and Sections, Cells: Structure, function and location, Prokaryotic and eukaryotic cells, Cell organelles, Cell division.

UNIT-2

Tissue, Types, Structure, Location and Function of Epithelial Tissue, Connective Tissue, Muscle Tissue, Nerve Tissue, Membranes, Glandular tissue The Integumentary System: structure and function of The Skin, Subcutaneous Tissue, Musculoskeletal System: Basic anatomy of important muscles and bones.

UNIT-3

Cell physiology: Structure, membrane, transport across cell membrane, Active, Passive, Organization of the Body, Body Composition, Body Fluid Volumes and its measurement, Diffusion, Osmosis, Tonicity, Homeostasis

UNIT-4

Blood-composition, function, cellular component & their function, haemoglobin & anaemia, blood groups and coagulation

BVMLT – 102 Basic concepts in MLT-1

UNIT-1

Basic principles and procedures of Laboratory: to develop understanding of the concept of healthy living, laboratory hazards, measuring and dispensing liquid, safety precautions with glass and plastic containers, choose glass or plastic container, clean glass and plastic, pH and buffer solution, procedure of hand hygiene, to be equipped with techniques of use of PPE. Basic concept of SGOT and SGPT, SGOT and point reaction.

UNIT-2

of different laboratory equipment's and instrument examples are balance, Bunsen burner, funnel, Care and maintenance of glassware: for example beaker, jars, flasks, test-tubes, Petri dishes, microscope slides, graduated cylinders, graduated pipette, stirring rods etc. cleaning methods, storage of glassware and glass apparatus, types pipette bulb, autoclave, centrifuge, laminar air flow, hot air oven, incubator, water bath, cell counter, microscope etc.

UNIT-3

Introduction to different laboratory reagents , solutions and stains : for example carbol fuchsin, gram's iodine, giemsa, crystal violet, leishman, saffranine, preparation of reagents for example hypochlorite, ethanol, formaldehyde etc. preparation of different types of media and agar**.**

UNIT-4

Infection control and prevention: Understand practices to curb infection, hospital borne infection, prevention and treatment of needle stick injury, understand the management of blood and body substance spillage in the health care setting.

Reference book: [*P.B Godkar, Henry's clinical diagnosis and management by laboratory methods]*

BVMLT – 103 Fundamentals of microbiology

UNIT-1

Introductory microbiology: Introduction to and brief of microbiology, scope and relevance of microbiology, modern developments in microbiology, explain the types and methods of sterilization, use and types of microscopes; bright microscope, field microscopy, dark field microscopy, phase contrast microscopy, electron microscopy.

UNIT-2

Morphology and structure of microorganisms: Morphology and structure of bacteria, fungi, actinomycete and algae etc., microscopic examination of microorganisms, preparation of culture media, spread plates, pour plates, types of selective and differential media, separation of pure cultures, principles and uses of microbiology equipments and instruments.

UNIT-3

Stains used in microbiology: Introduction to stains; importance of stain in microbiology; types of stains in detailed giving example-simple stain differential stain, negative stain, impregnation method; special staining for certain bacteria, bacterial spores, parasites and fungi; principle, procedure, application and result, interpretation of gram staining and ziehlneelsen staining.

Reference book: *[Burton's microbiology for the health science, the science of laboratory diagnosis, C.P Baveja, P.B godkar*"A Textbook of Basic and Applied Microbiology" by K R Aneja]

BVMLT – 104 Phlebotomy and Bio-Medical waste Management

UNIT-1

Introduction to phlebotomy: To work safely in a lab without cross infection, interpreting investigation slips, the necessary lab equipments used for collection, how to assist patient, how to locate appropriate site for obtaining blood samples, types of veins used for blood collection, how to draw blood specimen from patient, label sample, transport the sample to laboratory, specimen collection (syringe method) and preservation of blood, urine, stool, sputum blood culture etc. duties of phlebotomy technician in preparing, labeling and dispatching the blood reports update patient records.

UNIT-2

Bio-Medical waste Management : to manage bio medical waste in the work place, types of bio hazard bags, uses of different colors and types of bio hazard bags, Disposal of laboratory waste, Basics of accidents, common types of laboratory accidents, first aid in laboratory, human health and medical care in India, Medical laboratories of developing countries, importance of bio medical waste.

Reference Book: [success in phlebotomy, phlebotomy simplified, complete text book of phlebotomy]

BVMLT-105-Fundamental of Computers

UNIT-1

Introduction to Computers

History of Computer, Generations, Characteristics, Advantages and limitations of Computer, Classification of Computers, Functional Components of Computer, input, Output and Processing,

Concept of Hardware and Software, Data & Information. Concept of data storage. Number system. Decimal, Binary, Hexadecimal ASCII.

UNIT-2

Introduction to GUI Based Operating System Basics of Operating system, Basics of DOS & LINUX, The User interface, File and directory management, Windows setting, Control Panel, devices and Printer setting, Using various window commands for desktop.

UNIT-3

Word Processing

Word processing basics, Menu Bar, Opening and closing documents, save & save as, Page setup, print preview, and printing. Text creation and manipulation Editing, cut copy paste. Document creation, editing, Formatting the text – Paragraph indenting, bullets and numbering, changing case, Table manipulation – creation of table, insertion and deletion of cell, row and column.

UNIT-4

Network basics, Internet Basics of computer network LAN, WAN etc, Concept of Internet, Basic of Internet Architecture, Services on Internet Architecture, World wide web and websites, Communication on Internet, Internet Services, Preparing Computer for Internet Access, ISPs and Examples, Internet Access Technologies. Web Browsing, configuring web browser, Popular search engines Downloading and printing web pages. Internet application Basics of E-mail, E-mail addressing, forwarding and searching, Composing

BVMLT-106-General English and Soft Skill

UNIT-1Introduction to English language

a) Role and significance of English language in the present scenario
b) English language: its relevance for the Indian industry.
c) Introduction to listening, speaking, reading, writing and bench marking of the class.

UNIT- 2: Grammar and usage

Verbs
Determiners
Active Voice and Passive Voice
Tenses

UNIT- 3:

Letter writing & Notice Writing

UNIT- 4:

Précis and Report writing

Practical Knowledge

English communication Concept:
a) About myself, my family and my friends
b) Let's talk, making conversation, meeting and greeting
c) My opinions, my likes and dislikes
d) Life at collage, hostel and workplace: Conversation test

PRACTICALS:

BVMLTP-101.Practical Anatomy and Physiology

Human anatomy (practical)

Demonstration of

- Study of Human Skeleton parts with skeletal models.
- Study with charts and models of all organ systems mentioned above.
- Microscopic slides examination of elementary human tissues, cells.
- Major organs through models and permanent slides.
- Parts of circulatory system from models.
- Parts of respiratory system from models.
- Digestive system from models.
- Excretory system from models.

Human Physiology (Practical)

- To measure pulse rate
- To measure blood pressure
- To measure temperature
- Measurement of the Vital capacity
- Determination of blood groups
- Transport of food through esophagus
- Calculation and evaluation of daily energy and nutrient intake.

- Measurement of basal metabolic rate
- Demonstration of ECG
- Bile juice secretion and execration 11. Urine formation and execration
- Differential Leucocyte count by Peripheral blood smear.

BVMLTP-102- PRACTICALS Basic Concepts of LAB Technology-1

1. Principals and working of laboratory instruments
2. Importance and methods of cleaning of glass apparatus
3. Calibration of apparatus and glasswares
4. Preparation and standardization of volumetric solutions
5. Basic titration such as acid vs alkali, silver nitrate vs sodium chloride
6. Preparation of buffer solution and measurement of their pH Verification of Beer Lamber's Law
7. Verification of Beer Lamber's Law
8. Determination of serum creatinine : Alkaline picrate Method
9. Determination of serum glutamate pyruvate transaminase (SGPT) and serum glutamate Oxaloacetate transaminase
10. (SGOT) End point reaction
11. Sterilization Techniques

BVMLTP-103-Fundamentals of Microbiology

- Use of microscope in examination of unstained bacteria, fungi, algae, parasites and stained cell preparations including simple staining, Gram'sstaining, acid fast staining, capsule staining, spore stainingusing
- prokaryotic and eukaryotic cells, hanging drop preparation.
- Preparation of culture media, spread plates, pour plates,
- selective media, differential media.
- Separation of pure cultures and study the effect of selective nutrients on prokaryotes
- Isolation of Soil Bacteria, Soil Fungi, Soil Actinomycets
- Selective media for Soil microflora and use of growth factors, Study of Rhizosphere interactions, Quantitative measurements of Soil nutrients and Rhizosphere microflora and preparation of starter cultures of Rhizobia, Azotobacter.

BVMLTP-104-Phlebotomy & Bio Medical Waste Management

- Waste minimization
- color coding
- Liquid BMW, Radioactive waste, Metals / Chemicals / Drug waste
- BMW Management & methods of disinfection
- Modern technology for handling BMW
- Use of Personal protective equipment (PPE)

BVMLTP 105- Practical Fundamental of Computer

- Starting MS WORD, Creating and formatting a document,
- Changing fonts and point size,
- Table Creation and operations, Autocorrect, Auto text, spell Check, Word Art, Inserting
- objects, Page setup, Page Preview, Printing a document, Mail Merge.
- Starting Excel, Work sheet, cell inserting Data into Rows/ Columns, Alignment, Text
- wrapping , Sorting data, Auto Sum, Use of functions, referencing formula cells in other
- formulae , Naming cells, Generating graphs, Worksheet data and charts with WORD, Creating

- Hyperlink to a WORD document , Page set up, Print Preview, Printing Worksheets.
- Starting MS–Power Point,, Creating a presentation using auto content Wizard, Blank
- Presentation, creating, saving and printing a presentation, Adding a slide to presentation,
- Navigating through a presentation, slide sorter, slide show, editing slides, Using Clipart, Word
- art gallery, Adding Transition and Animation effects, setting timings for slide show, preparing
- note pages, preparing audience handouts, printing presentation documents, MS- Access,
- Creating tables and database, Internet, Use of Internet (Mailing, Browsing, Surfing).

Semester 2

BVMLT -201 Fundamental of Human Anatomy & Physiology-II

UNIT-1

Cardiovascular system: Basic anatomy of heart and important blood vessels Brief introduction about Lymphatic System, The Nervous System: Basic anatomy of brain and spinal cord, meninges and cerebrospinal fluid, Cranial, Endocrine System: Brief anatomy of Pituitary, Thyroid, Parathyroid, Pancreas, Adrenal, Special Senses: Basic anatomy of eye, ear and nose

UNIT-2

Genitourinary system: Basic anatomy of kidney and associated organs, male reproductive organs, female reproductive organs, Respiratory system: Basic anatomy of nose, larynx, trachea, bronchi and lung, Digestive system: basic anatomy of esophagus, stomach, small intestine, large intestine, liver, gall bladder, pancreas

UNIT-3

Cardiovascular system-general arrange, heart, arteries, veins and capillaries, heart structure and function, cardiac cycle, heart sounds, heart rate, blood pressure, mechanism of circulation, definition of hypertension & shock ,Respiratory system: parts of respiratory system, mechanism of respiration, pulmonary function, pulmonary circulation, lungs volume, Gas transport between lungs and tissues, Definition of hypoxia, dyspnoea, cyanosis, asphyxia and obstructive airways diseases Unit, Gastrointestinal physiology: Organs of GIT and their structure & function, secretion, digestion, absorption and assimilation, gastrointestinal hormones, physiology of digestion of carbohydrates, proteins & lipids, Structure & function of liver, spleen, gall bladder & pancreas, Jaundice, Cirrhosis & Pancreatitis.

UNIT-4

Excretory System: Kidneys, Nephron, Mechanism of Excretion, Urine formation (Glomerular filtration and Tubular reabsorption) , Electrolytes: their balances and imbalances Introduction of acidosis and alkalosis , Muscle nerve physiology, types of muscles, their gross structural and functional difference with reference to properties ,Nervous system- general organization of CNS, function of important structure and spinal cord, neuron, nerve impulse, type of nerves according to function, Autonomic nervous systemorganization & function Special senses-general organization & functions,Endocrine System: Brief introduction about endocrine glands and their secretion, common endocrinological disorder such as diabetes mellitus, hyper & hypothyroidism, dwarfism, gigantism, tetany. Reproductive System: male & female reproductive organs, sex hormones, secondary sexual characteristics, puberty, spermatogenesis, oogenesis, menstrual cycle, pregnancy, menopause, contraceptive measures.

BVMLT -202 Clinical Pathology

UNIT-1

Urine Examination: urine analysis, routine examination of urine, chemical examination of urine, microscopic examination of urine, clinical significance, specimen collection, laboratory investigation.

UNIT-2

Stool examination: gross examination, physical examination, determination of pH, chemical examination of feces, microscopic examination of stool specimen, clinical significance, specimen collection, laboratory investigation.

UNIT-3

Sputum examination: Indication collection, container, transport, preservation for different types of sputum analysis, physical, chemical and microscopic examination and its significance.

UNIT-4

Semen examination : semen analysis, routine examination of semen, quantitative determination of semen fructose, interpretative semen analysis, examination for the presence of sperms.

Reference book: [essential of clinical pathology, clinical pathology board review, Henry's clinical pathology, Quick compendium of clinical pathology, Harsh mohan]

BVMLT –203 Introduction to Hematology

UNIT-1

Blood: Composition and functions of blood, blood cells-RBC's, WBC's Platelet, serum, plasma, hemoglobin, haematopoietic systems of human body, human blood group system, body fluids, blood volume, homeostasis, stages of RBC's, WBC's and platelets.

UNIT-2

Haematological disorders and disorders: classification of anemia- morphology and etiological, iron deficiency anemia- distribution of iron in body, iron absorption, causes of iron deficiency, lab findings, megaloblasticanemia- causes and lab findings, hemolyticanemia- causes and lab findings, thalessemia, HDN, multiple myeloma, polycythemia, parasitic infection of blood.

UNIT-3

Bone Marrow: cell composition of normal adult bone marrow, aspiration, indication, preparation and staining, special stain for bone marrow- periodic Acid Schiff, Sudan black, myeloperoxidase, leukemia- classification, blood picture, differentiation of blast cells.

UNIT-4

Coagulopathies and bleeding disorder: bleeding disorders, haemostasis, mechanism of coagulation, clotting or coagulation factors, routine coagulation tests- prothrombin time, activated partial thromboplastin time, bleeding time, clotting time, Clot retraction time, laboratory diagnosis of bleeding disorder.

Reference book: [hematology board review, blue prints hematology, diagnostic cytology and hematology, P.B Godkar]

BVMLT -204 **Introduction to Bio-Chemistry**

UNIT – 1

Introduction to Biochemistry , study of Proteins, notably enzyme catalysis and kinetics ,
Structure and biological function of carbohydrates, liquid ,& nucleic acid (DNA & RNA).

UNIT – 2

Carbohydrate metabolism : Glycolysis and alcoholic feracentation, Pentose phosphate pathway, glycosylate pathway, CA Lycle, glycogeusis, gluconeogenesis

Protein metabolisms :

Deamination, transamination and decarboxylation. Urea cycle, Catabolism of carbon skeletons of amino acids.

Details of human mentation .

UNIT – 3

Biochemical test profile : Detail of renal function tests, chemical test en renal disease, detail of gastric function test of acid base balance concepts & disorder.

UNIT – 4

Analytical technique : Basics steps in analytical chemistry , electrochemistry, photometry , immune – chemistry, principles of analytical chemistry,

Reference book: [Kaplan MCAT biochemistry audio review, BRS biochemistry, Schaum's outline of biochemistry, pankaja naik]

BVMLT –205 **Advance Phlebotomy & Lab Ethics**

UNIT-1

Specimen Collection (blood(vaccutainer method) , urine ,sputum, stool etc.) : characteristics if good phlebotomist, preparation of specimen collection, basics steps for drawing of blood specimen by vein puncture, complications of vein puncture, specimen rejection criteria for blood specimen, hemolysis of blood, blood collection by skin puncture (capillary puncture) arterial puncture.

UNIT-2

Phlebotomy: order of draw for specimen collection, types of anticoagulant, types of vaccutainers, separation of serum and plasma, difference between serum and plasma, maintenance of specimen identification, transport of specimen, effect of storage on blood cell morphology, universal precautions.

UNIT-3

Lab ethics: maintaining equipments, awareness of requisition form, specimen rejection record, data management, ethical consideration, train the technician, standard operating procedures, calibration, quality control.

Reference book: [success in phlebotomy, phlebotomy simplified, complete text book of phlebotomy]

BVMLT-206-Basic of Health market and Economy

UNIT- I

Health Care Market anIntroduction : Main Problems in the Market for Health Care, Health Care andEconomic Basics, Analysing Health Care Markets. Demand-Side Considerations: Demand for Healthand Health Care, Market for Health Insurance

UNIT- II

Supply-Side Considerations: Managed Care, Health Care Professionals, Hospital Services,Confounding Factors Public Policy in Medical Care: Policies to Enhance Access, Policies to ContainCosts, Medical Care Systems Worldwide,

UNIT-III

Health Sector in India: An Overview Health Outcomes; Health Systems; Health Financing
Evaluation of Health Programs Costing, Cost Effectiveness and Cost-Benefit Analysis; Burden ofDiseases ,Role of WHO , Health Care Budget: purpose, types & practices in Indian context.

UNIT-IV

Health Economics: Fundamentals of Economics: Scope & coverage of Health Economics, demand forHealth Sciences; Health as an investment, population, Health &Economic Development.

Tools of Economics-Concepts of need, demand, supply & price in Health Services.Methods & Techniques of Economic Evaluation of Health Programmes: Cost benefit&cost-effective methods-output & input analysis.

Market, monopoly, perfect & imperfect competition. Health Financing from various sources – Public ,Private, TPA.

Economics of Health Programmes for Nutrition, diet &population control, economics of abuse oftobacco & alcohol, environmental influences on health and feeding.

Economics of Communicable (STDs & Malaria) & non-communicable (IHD & Cancers) diseases.

PRACTICALS:

BVMLTP-201-PRACTICAL-General Human Anatomy & Physiology-II

Human Anatomy-II (Practical)

Demonstration of:

- ModelsNervous system from models.
- Structure of eye and ear
- Structural differences between skeletal, smooth and cardiac muscles.
- Various bones
- Various joints
- Various parts of male & female reproductive system from

Human Physiology- II (Practical)

- To perform total platelet count.
- To perform bleeding time.
- To perform clotting time.
- To study about CSF examination.
- To study about intrauterine contraceptive devices.
- To demonstrate microscopic structure of bones with permanent slides.

BVMLTP-202-Clinical pathology

- Estimation of blood sugar level of plasma (or serum)
- (a) orthotoluidine method (b)glucose-oxidase method
- To perform pregnancy test by dipstick method
- Estimation of the serum urea nitrogen
- Estimation of serum creatinine. (a)alkaline-picrate method.
- Determination of protein in blood
- Albumin, globulin ,total protein
- Determination of serum bilirubin. (a)malloy and evelyn.
- (b)DMSO method.
- Determination of serum bilirubin. (a)malloy and evelyn.
- (b)DMSO method.
- Determination of serum glutamate pyruvate transaminase(SGPT) and serum glutamate oxaloacette tranasaminase(SGOT) (a)end point reaction
- Determination of serum alkaline phosphatase
- To perform glucose tolerance test

BVMLTP-203-Introduction to Hematology

- study sickling test using 2% sodium metabisulphite
- Determination of reticulocyte count.
- Determination of prothrombin time
- Determination of glucose-6-phosphate dehydrogenase(G-6-PD)

BVMLTP-204-Introduction to Bio chemistry

- 1. Analysis of Normal Urine
- 2. Liver Function tests
- 3. Lipid Profile
- 4. Renal Function test
- 5. Blood gas and Electrolytes
- 6. Demonstration of Glucometer with strips
- ELISA

BVMLTP-205-Advance Phlebotomy & Lab Ethics

- To learn general laboratory safety rules.
- To demonstrate glasswares, apparatus and plasticwares used in laboratory.
- To demonstrate method of blood collection.
- To separate serum and plasma.
- To demostrate quality control in lab
- To learn sampling

SEMESTER 3

BVMLT –301 Basic concepts in MLT-2

UNIT-1

Role of the acts and regulation including safety protocols, confidential protocols and home visit protocols, training the technicians, laboratory infrastructure, clinical laboratory management, requisition form, accession list, guidelines of good clinical laboratory, specimen rejection record, data management.

UNIT-2

Role of medical lab technician: To develop broad understanding of the role of MLT, patient comforts, safety and laboratory test result, to exhibit ethical behavior, to develop techniques of grooming, to be vaccinated against common infectious disease, precautions to ensure sample preservation while transport, basics of the first aid, precautions to ensure self-safety.

UNIT-3

Documentation: Understand guidelines for documentation, various types of records in laboratory setup, uses and importance of records in laboratory setup, essential requirement of records, understand abbreviations and symbols, enter transcribe, record, store, or maintain information.

UNIT-4

Professional behaviour in healthcare setting: Learn to maintain restful environment, general and specific etiquettes, legal and ethical issues, impact of comfort on patients health, importance and methodology of cleanliness, and hygiene environment in collection, acquire elementary knowledge on good clinical laboratory practices of WHO.

Reference book:*[P.B Godkar, Henry's clinical diagnosis and management by laboratory methods]*

*BVMLT -302*Routine and special Hematological Test

UNIT-1

Routine hematological tests 1: determination of hemoglobin concentration by Sahli's method, cyanmeth method, determination of total erythrocyte count, total leucocyte count, platelet count, packed cell volume (hematocrit), erythrocyte sedimentation rate, enumeration of formed elements.

UNIT-2

Routine hematological tests 2: Determination and calculation of red blood cell indices- MCV(mean cell volume), MCH (mean cell hemoglobin), MCHC (mean cell hemoglobin concentration, study of blood smear, reticulocyte count, differential leucocyte count (DLC) eosinophill count, preparation of blood smear.

UNIT-3

Special hematological tests: screening of sickle cell anaemia, estimation of foetal hemoglobin, hemoglobin electrophoresis, osmotic fragility test, Heinz body preparation, laboratory diagnosis of blood parasites, lupus erythematosus (LE), preparation of bone marrow smear for microscopic examination for microscopic examination, cytochemical tests.

Reference book:[hematology board review, blue prints hematology, diagnostic cytology and hematology, P.B Godkar]

BVMLT –303 Microbial Physiology-Metabolism

UNIT-1

Microbial nutrition, cultivation, isolation and preservation: requirements for growth, physical requirement , chemical requirements , culture media, chemically defined media, complex media, anaerobic growth media, selective media, enrichment culture, cultivation of aerobes and anaerobes, microbial growth, growth in population, bacterial growth, measurement of growth in bacteria, factors affecting growth in microorganisms.

UNIT-2

Enzyme Regulation: enzymes and their regulation, chemical and physical properties of enzymes, nomenclature of enzymes, mechanism of enzyme action. Inhibition of enzyme action, regulation of enzyme, replication of DNA molecules, transcription and translation (process of protein synthesis).

UNIT-3

Microbial metabolism: respiration and fermentation, glycolysis, pentose pathway, the Entner doudoroff pathway, tri-carboxylic acid cycle, catabolism of lipid, protein, glycoxylate cycle, Beta oxidation. Bacterial genetics- conjugation, transformation, transduction.

UNIT-4

Microbial utilization of energy and Biosynthesis: transport of nutrient by bacteria, biochemical mechanism of generation of ATP, synthesis of amino acid- glutamate, lysine, glutamine, serine, arginine family, structure and bio synthesis of peptidoglycon, carbohydrates and phospholipids.

Reference book: *[Burton's microbiology for the health science, the science of laboratory diagnosis, C.P Baveja,* "A Textbook of Basic and Applied Microbiology" by K R Aneja]

BVMLT -304 **Blood Banking**

UNIT-1

Blood Grouping: introduction, ABO subgroups, red cell antigen, natural antibodies, Rh system, Rh antigen and antibodies, hemolytic disease of new born and prevention, principle of blood grouping, antigen antibody reaction, agglutination, haemagglutination, conditions required for antigen antibody reaction, blood grouping techniques, cell grouping, serum grouping, difficulties in ABO grouping, rouleaux formation, inheritance of blood groups, A&B cell preparation.

UNIT-2

Blood donation and transfusion: principal and practice of blood transfusion, guidelines for the use of blood, blood transfusion practices, procedure for usage, storage of blood, screening of donor, blood donor requirements, criteria for selection and rejection, medical history and personal details, health checks before donating blood, screening for TTI.

UNIT-3

Blood collection, storage and transport and maintenance of blood bank records: blood collection packs, anticoagulants, taking and giving sets in blood transfusion, techniques of collection blood, instructions given to the donor, screening donor's for infectious agents, bacterial contaminated blood, blood donation record book, blood donor card, storage of blood, change in blood after storage, transportation blood bank temperature sheet, stock sheet, blood transfusion request form.

UNIT-4

Compatibility, blood components and blood transfusion reaction: purpose of compatibility testing, single tube and emergency compatibility testing techniques, difficulties in cross match, collection of blood components for transfusion, platelets, packed red cell, PRP, investigation of a transfusion reaction, hemolytic transfusion reaction, actions to take when transfusion reaction occurs.

Reference book: [Basic and applied concepts of blood banking and transfusion practices, blood banking and transfusion medicine, modern blood banking and transfusion practices]

BVMLT-305- Advance Computing Skill

UNIT-1

Advance Word Processing Tools
Setting the layout of Table and documents, Mail merge techniques. Letter envelopes etc,
Using spell check and Thesaurus, Foot note nad Endnotes, Using Charts , shapes and pictures in word .

UNIT-2

Basics of Spreadsheet
Functions of Spreadsheet , Applications , Elements of Electronic Spread sheet ,creating document saving and printing the worksheet, manipulation of cells ,Functions and charts, using formulas , Functions and charts

UNIT-3

Advance Spreadsheet Tools
Manipulations with charts and its types, Sorting, Filtering of data ,Pivot table, data validation techniques. Grouping and subtotaling of data. Text to column option . Printing of customized worksheet.

UNIT-4

Presentation Software
Using PowerPoint, Opening an PowerPoint presentation, Saving a presentation , Entering and editing text, inserting and deleting slides in a presentation , preparation of slides , adding clip arts, charts etc., Providing Aesthetics ,enhancing text presentation ,working with color lines styles and movie and sound ,adding header and footer, presentation.

BVMLT-306-Human Value and Professional Ethics

UNIT-1

Need, Basic Guidelines, Content and Process forValue EducationUnderstanding the need, basic guidelines, content and process for Value EducationSelf-Exploration its content and process, Natural Acceptance' and Experiential Validation- as themechanism for self-explorationContinuous Happiness and Prosperity- A look at basic Human Aspirations
Right understanding, Relationship and Physical Facilities- the basic requirements for fulfilment ofaspirations of every human being with their correct priority

Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
Method to fulfil the above human aspirations: understanding and living in harmony at variouslevels

UNIT 2

Understanding Harmony in the Human Being Understanding human being
Understanding the Body as an instrument
Understanding the harmony of Body, correct appraisal of Physical needs, meaning of Prosperity in detail

UNIT 3

Understanding Harmony in the Family and Society-
Harmony in Human Relationship
Understanding Harmony in the family – the basic unit of human interaction
Understanding values in human-human relationship
Trust and Respect as the foundational values of relationship
Understanding the meaning of trust
Difference between intention and competence. Understanding the meaning of respect
Understanding the harmony in the society (society being an extension of family)

UNIT-4

Natural acceptance of human values
Definitiveness of Ethical Human Conduct
Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
Competence in professional ethics:
a) Ability to utilize the professional competence for augmenting universal human order
b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems,
c) Ability to identify and develop appropriate technologies and management patterns for above production systems.

Case studies of typical holistic technologies, management models and production systems
Strategy for transition from the present state to Universal Human Order:
a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers
b) At the level of society: as mutually enriching institutions and organizations

PRACTICALS:

BVMLTP-301-Basic concepts in MLT-2

- To prepare of the 1/10 N HCL
- To prepare the different concentration of solutions.

- To prepare different bulbs required in the laboratory
- To find out the normality of given solution
- Routine examination of urine (physical examination of urine)
- Determination of specific gravity of urine by urinometer and refractormeter
- Chemical examination of urine.
- Microscopic examination of urine
- Physical and chemical examination of semen
- Microscopic examination of semen
- Physical examination of stool
- Chemical examination of stool
- Microscopic examination of stool
- Determination of reducing substances in stool
- Determination of reducing substances in stool

BVMLTP-302-Routine Hematological Test

- Determination of blood clotting time 1.capillary method
- 2.tube method
- Determination of the foetal haemoglobin
- Determination of the anti-D antibody titer
- To perform indirect coomb's test

BVMLTP-303-Microbial physiology metabolism

- Measurement of Soil Enzymes.
- Use of ultraviolet light for its germicidal effect.
- The replica plating technique.
- Presumptive, confirmed and completed tests for safety of water supplies
- Effect of temperature, Osmotic pressure, energy source etc. on growth of prokaryotes
- Relation of free oxygen to microbial growth, monitoring
- of dissolved oxygen in various effluents
- Determination of COD in Industrial effluents.
- Effects of antimetabolites on Microbial culture (Inhibition by Sulfanilamide).
- Determination of Water Activity of various substrates and
- assay of surface-active agents.
- Turbidimetric/spectrophotometric monitoring of growth using liquid cultures.
- Efficiency of photosynthesis in photoautotrophs.

BVMLTP-304-Blood Banking

- To perform direct coomb's test
- To perform cross matching test by saline-tube method
- Determination of D by tube method.
- Qualitative test for Determination of D(Rho) antigen on human red blood cells.
- 1.tube method 2.slide method
- Determination of serum sodium and potassium using flame
- photometer/commercial kit
- Determination of serum chloride
- Determination of bleeding time

BVMLTP-305- Practical Advance Computing skills

- Word Processing
- Mail merge techniques
- Using Charts , shapes and pictures in word .
- Basics of Spreadsheet
- document saving and printing the worksheet
- formulas , Functions and charts
- Advance Spreadsheet Tools
- worksheet.
- Presentation Software
- Using PowerPoint working with color lines
- styles and movie and sound ,presentations.

SEMESTER 4

BVMLT -401 Serology and Immunology

UNIT-1

Introduction to serology: principles of immunologic reactions, serodiagnosis, collection and preparation of specimen, antigen, antibodies, structure and classes of antibodies, monoclonal antibodies and its uses.

UNIT-2

Serological tests: Serological tests for syphilis, agglutination, CRP, rheumatoid arthritis test, serodiagnosis of streptococcal infection, HBsAg, HIV, widal test, tuberculin test, serodiagnosis for miscellaneous disorders, immunologic test for pregnancy RIA, ELISA.

UNIT-3

Introduction to immunology and antigen antibody reaction: physical and chemical barriers, phagocytosis, inflammation, fever, types of immunity, immunological memory, lymphoid organs, MALT, CALT, cells of immune system, factors affecting immunogenicity, epitopes, hap tens, antigen antibody reaction, immunodiffusion test, immune electrophoresis, CFT, western blotting, types of vaccinines.

UNIT-4

Humoral and cell mediated immunity: humoral immune response, structure, functions and types of immunoglobulins, factors influencing antibody production, mechanism of CMI, types of effector T cells, Helper T cells, suppressor T-cells, cytotoxic T-cells, killer T cells, cytokines, lymphokines, macrophage, complement system, HLA, monoclonal antibody technology and its application, interactions between Band T lymphocytes.

Reference book: [contemporary clinical immunology and serology, clinical immunology and serology, introductory immunology by Jeffrey k. actor]

BVMLT -402 Bacteriology

UNIT-1

Bacteriology-1:Gram positive bacteria- streptococcus, bacillus, mycobacterium, Corynebacterium etc.

UNIT-2

Bacteriology-2 Gram negative bacteria- E-coli, klebsiella, salmonella, shigella, vibrio, psedumonas etc.

UNIT-3

Diagnostic and systemic bacteriology-1: staphylococcus, streptococcus, spirochetes, mycoplasma, rickettsia etc, systemic grouping of pathogenic bacteria, laboratory investigation of infectious agent.

UNIT-4

Diagnostic and systemic bacteriology-2: Diagnosis of anaerobic infections, identifying characteristics if common pathogenic bacteria, antimicrobial susceptibility test, IMViC, urease, catalase, geletine liquification, coagulase, oxidase, sugar fermentation, antibiotic sensitivity test.

Reference book: [Diagnostic bacteriology, essentials of bacteriology, manual of bacteriology]

BVMLT -403 Bio-Chemistry Metabolism

UNIT– 1

Lipid Metabolism : Oxidation of fatty a aids degradation of triglyceride's and phospholipase. Formations and utilization of ketone bodies. Biosynthesis of stented and unsaturated fatty acids. Biosynthesis of higlyceiday and phospholipids, Biosynthesis of cholemol . Biosynthesis of prastaglaudio lipoxims, prostacyclin's.

UNIT-2

Digestion of muclric acids: Degradation of purines and pysimidiges , biosynthesis of period , pyrimidine's and nucledhdes. Cataholismy of hence and formation of bile pigments. Biosynthesis of porphrius and hence.
Water and mineral metabolism.

UNIT– 3

Details of Liver function tests. Details of cardiac profile tests. Details of acid base concepts of disorder.

Reference book: [Kaplan MCAT biochemistry audio review, BRS biochemistry, Schaum's outline of biochemistry]

BVMLT -404 Pathogenic microbiology

UNIT-1

Infectious disease: Brief introduction to terminology of infectious diseases, frequency of disease, recognition of infectious diseases, infections, disease cycle, virulence and mode of transmission, emerging and re-emerging infectious diseases, global travel and health considerations, nosocomial infections.

UNIT-2

Microbes of medical importance: nomenclature and classification of microbes of medical importance. Origin of normal flora, distribution and occurrence of normal flora of skin, eyes, respiratory tract, mouth, intestinal tract and urinary tract.

UNIT-3

Mode of microbial infections: microbial adherence, passive penetration into body, active penetration into body, events in infection following penetration, microbial virulence factors.

UNIT-4

Antimicrobial Drugs: Development of chemotherapy, general characteristics of antimicrobial drugs, determination level of antimicrobial activity, mechanisms of action of antimicrobial agents, factors influencing the effectiveness of antimicrobial drugs, antimicrobial drugs example sulfonamides, quinolones, penicillins, cephalosporins, tetracyclines, erythromicin, chloramphenicol, drug resistance, antifungal and antiviral drugs.

Reference book:*[Burton's microbiology for the health science, the science of laboratory diagnosis, C.P Baveja,* "A Textbook of Basic and Applied Microbiology" by K R Aneja]

BVMLT -405 Genetics

UNIT-1

Recombinant DNA Technology: Genetic engineering and gene cloning in microorganisms, strategies of genetic engineering, restriction enzymes, vectors, plasmids, genetic engineering for human welfare- 1) production of pharmaceuticals 2) insects pest control 3) use of genetically engineered microorganisms for control of pollution.

UNIT-2

Genetics: Genetics disorder, karyotyping, electrophoresis and hybridization techniques, introduction to medical genetics, structure of RNA and DNA, genetics of common diseases, CLIA techniques. Gene mutation, gene therapy, chromosome mapping, mendelian genetics.

Reference book: [essential for medical genetics for health professionals, medical genetics at the glance, C.P Baveja]

BVMLT-406-Advance communication and soft skill

UNIT-1

Functional Grammar-II

a) Application writing
b) Paragraph writing, essay writing and précis writing
c) Pre-testing of oral and writing skills

UNIT-2

Professional Skills

a) Biodata, CV and resume writing
b) Joining letter, cover letter and resignation letter
c) Inter- office memo, formal Business letter, informal notes
d) Minutes of the meeting, reporting events, summary writing

UNIT-3

Presentation skills

a) Power-point presentations and presenting techniques
b) Body language

c) Describing people, places and events
d) Extempore, speech and just- a minute sessions

UNIT-4

Interview skills

a) Developing skills to- debate, discussion, basics of GD and styles of GD
b) Discussion in groups and group discussion on current issues
c) Steps to prepare for an interview and mock interviews
Public speaking
a) Art of public speaking
b) Welcome speech
c) Farewell speech
d) Votes of thanks

Oral practice

a) Debate
b) Just-a-minute
c) Group discussion
d) Mock interviews

PRACTICALS:

BVMLTP-401-Serology & Immunology

- Demonstration of Immune cells in the smears prepared
- from Immune organs.
- Demonstration of Immune organs in dissected animal.
- Complement fixation.

Antigen-antibody interactions

- Agglutination
- Precipitation
- Blood grouping

- IMVic test
- Catalase test 3.Coagulase test 4.Oxidase test
- Gelatin liquefaction test 6.Urease test
- To perform RA test by latex agglutination
- To perform VDRL test/RPR
- To perform widal test-by tube method or slide method
- Identification of malarial parasite by using blood smear.
- Identification of ova/cyst from given stool sample. 1.iodine preparation
- 2.saline preparation
- Antibiotic sensitivity test from stalk culture or biological specimen using commercial plates and discs
- Identification of organism from pus sample.

BVMLTP-402-Bacteriology

- Staining
- Grams staining
- ZN staining
- Alberts staining
- Hanging drop preparation
- Culture methods
- Introduction to biochemical reactions
- Identification of bacterial culture
- Colony characteristics
- Morphological characteristics
- Motility study
- Interpretation of biochemical reactions
- Antibiotic sensitivity testing- Kirby Bauer method
- Applied bacteriology- exercise
- Immunology: Serological tests:
- Specimen collection Principle, Methods,Procedure
- Normal values/ significant titer
- Interpretations
- Limitations: of all the following tests

- Widal
- ASO
- CRP
- RPR/VDRL/TRUST
- RA
- HBsAg /anti-HIV detection
- ELISA

BVMLT-403-Bio-Chemistry Metabolism

- Colorimetric estimation of inorganic phosphate.
- Estimation of Lipoproteins in plasma
- Estimation of proteins by Lowry's method.
- Estimation of total lipids in serum by Vanillin method.
- Estimation of total and free cholesterol in serum.
- Estimation of Ca+ in serum
- Estimation of blood glucose by the methods of (i) Folin
- Wu (ii) Nelson Somogyi.
- Isolation and assay of glycogen from rat liver.

BVMLTP-404-PathoGenic Microbiology

- Identification of both gram positive and gram-negative microorganisms on the basis of : (i) Morphology.
- Bio-chemicalcharacteristics.
- Serologicalreactions.
- Demonstration of pathogens (Viruses, fungi, parasites) in permanent mounted slides.
- Demonstration of cysts/ovas of protozoa/Helminths.
- Demonstration of Laboratory grown fungi on sabauraud's

- agar.
- Demonstration of Laboratory grown fungi on sabauraud's
- agar.
- Germ tube test for candida albicans
- Demonstration of fungi through normal saline/KOH
- preparation.

BVMLTP-405-Genetics

- To perform separation of amino acids by paper chromatography
- To perform separation of amino acids by thin layer chromatography
- To perform separation of DNA by Agarose gel electrophoresis.
- Separation of protein by PAGE
- Separation of protein by paper electrophoresis
- Isolation of DNA
- Separation of DNA by Agarose gel electrophoresis
- Demonstration of thermal cycler and PCR.
- Demonstration of PCR HLA B-27
- Demonstration of PCR HIV
- Demonstration of PCR MTB

SEMESTER 5

BVMLT -501Histopathology and cytology

UNIT-1

Histopathology : introduction to histology, basic terminology, laboratory equipment's for histology, use and care of frequently used equipment's, preparation of reagent solutions, logging of specimen, preparation of tissues, processing of tissues, frozen section techniques, handling and embedding of small tissue fragments.

UNIT-2

Staning procedure in histology: Routine staining procedure in histotechnology, special stains ad staining techniques, stain for particular substance, instrumentation in histotechnology, auto analyzer, tissue processor, microtome.

UNIT-3

Cytology: introduction to cytology, laboratory equipment's for cytology, diagnostics cytology, preparation of specimens for cytology evaluation, staining techniques, cytological stains and staining techniques, FNAC

UNIT-4

Exfoliative cytology: characteristics of benign and malignant cells, advanced instrumentation in laboratory technologies.

Reference book: [Atlas of forensic histopathology, Curran's Atlas of histopathology, forensic histopathology]

BVMLT -502 Parasitology and virology

UNIT-1

Parasitology : Definition of parasite, host, vector etc, classification of parasites, phylum protozoa-general pathogenic and non-pathogenic protozoa, phylum nemathelminths/round worms (nematodes), phylum platyhelminths- class-cestode, trematode, laboratory diagnosis of parasitic infection.

UNIT-2

Protozoa: intestinal amoeba a) E.coli and E. histolytica- lifecycle, morphology, disease and lab diagnosis, flagellates of intestine b) giardia lamblia and trichomonas- lifecycle, morphology, disease, lab diagnosis, malaria parasite, c) plasmodium vivax life cycle, morphology, disease, lab diagnosis, difference between p.vivax, p. malariae, p.falciparam, p.ovale.

UNIT-3

Nematodes: Intestinal nematodes- Ascaris- life cycle, morphology, disease and lab diagnosis, brief discussion about enterobius vermicularis and ancyclostoma duodenale, tissue nematodes- w.bancrifti- lifecycle, morphology, disease and lab diagnosis, phylum platyhelminths- T. solium, T. saginata and E. granulosus (in brief), Trematodes- s. haematobium, F. hepatica (in brief).

UNIT-4

Virology: general characteristics of virology, classification of virology, lab diagnosis of viral infections, cultivation of viruses, bacteriophage, HIV, hepatitis virus, pox virus, polio, influenza, chikungunya, dengue, adeno virus, DNA and RNA containing virus, general transmission routes for virus.

Reference book: [Clinical virology 4th edition, an introduction to microbiology by P.Tauro]

BVMLT -503 Endocrinology,Tumor and cancer markers

UNIT-1

Endocrinology-1: introduction, difference between hormones and enzymes, regulation and general mechanism of action of hormones, pituitary glands and hypothalamus, hormones of pituitary gland- growth hormone, prolactin, gonadotropin, follicle stimulating hormone, leutinizing hormone, thyroid stimulating hormone, adrenocorticotrophic hormone, oxytocin, ADH, hormones of the thyroid gland, thyroid disorder.

UNIT-2

Endocrinology-2: Adrenocortical hormones- synthesis, and secretion, aldosterone and its function, cortosol and its function, cushing's syndrome, Conn's syndrome, adrenal medulla- metabolism, hormones of the gonads- testosterone, estrogen, progesterone their synthesis and functions, HCG hormone, menstrual cycle, menopause, hormones of pancreas- insulin- its metabolic effects on carbohydrates, fats and proteins, control of insulin secretion, glucagon- functions, metabolic effects, blood glucose regulation, diabetes mellitus, somatostatin, hormones of kidney –rennin.

UNIT-3

Tumor and cancer marker-1: Introduction, the carcinogens- definition, oncogene- definition, mechanism of action, characteristics of growing tumor cells- general, morphological, biochemical changes, Tumor Markers- introduction and definition, clinical classification of tumor markers, enzymes as tumor markers, alkaline phosphatase, creatine phosphatase, lactate dehydrogenase, prostatic acid phosphatase, prostate specific antigens(PSA).

UNIT-4

Tumor and cancer marker-2: Hormones as tumor markers (introduction of each type in brief), oncofetal antigens, alpha feto protein, carcino embryonic antigen, squamous cell carcinoma antigen, carbohydrate markers (brief introduction of each type), CA-125, blood group antigen, bladder cancer markers, FDP, nuclear matrix protein.

Reference book: [William's text book of endocrinology, endocrinology secrets, the biology of cancer, cancer biology]

BVMLT -504 Advance biochemical testing techniques

UNIT-1

Chromatography: Separation and identification of amino acids by paper chromatography and thin layer chromatography.

UNIT-2

Phospholipids: separation of phospholipids by thin layer chromatography.

UNIT-3

Lactic acid: Estimation of lactic acid in blood before and after exercise.

UNIT-4

Starch: Preparation of starch from potato and its hydrolysis by salivary amylase

Reference book: [Kaplan MCAT biochemistry audio review, BRS biochemistry, Schaum's outline of biochemistry]

BVMLT-505-Digital literacy &Account Literacy

UNIT- 1

Review of MS office
Advance options in MS excel
Excel
Power point
Introduction to internet learning platform
Using internet-based learning platform
Using google and you tube for learning
Using smart phone to become smart

UNIT-2

Benefits of digital learning
Using internet for personal requirement
Online payments method
Use of social media for advisement
Digital security and privacy
Various cybercrime and their safety guideline
Best practice for securing online and network transaction
Managing privacy and security and social media accounts

UNIT-3

Introduction and basic of financial planning
Concept of time and value of money
Risk and return
Myths about easy money
Financial planning with examples
Introduction to financial market and institution investment option in post office
Sources of finance
Capital market basics
Basic of money market
Mutual funds

UNIT-4

Life insurance
General insurance
Types of banks
KYC
Function of commercial banks and RBI and its function
Deposit accounts-understanding of operation
Retail finance

Personal loan
Corporate banking
Cheque collecting services
Payments modes in banking system

BVMLT-506-introduction to National Healthcare system

UNIT-1

1. Introduction to healthcare delivery system

a. Healthcare delivery system in India at primary, secondary and tertiary care
b. Community participation in healthcare delivery system
c. Health system in developed countries.
d. Private Sector
e. National Health Mission
f. National Health Policy
g. Issues in Health Care Delivery System in India

UNIT-2

2. National Health Programme- Background objectives, action plan, targets, operations, achievements and constraints in various National Heath Programme.

UNIT-3

3. Introduction to AYUSH system of medicine
a. Introduction to Ayurveda.
b. Yoga and Naturopathy
c. Unani
d. Siddha
e. Homeopathy
f. Need for integration of various system of medicine

UNIT-4

4. Health scenario of India- past, present and future
Demography & Vital Statistics-
a. Demography – its concept
b. Vital events of life & its impact on demography
c. Significance and recording of vital statistics
d. Census & its impact on health policy
6. Epidemiology
a. Principles of Epidemiology

b. Natural History of disease
c. Methods of Epidemiological studies
d. Epidemiology of communicable & non-communicable diseases, disease transmission, host defense immunizing agents, cold chain, immunization, disease monitoring and surveillance.

PRACTICALS:

BVMLTP-501-Histopathology & Cytology

- To study autoanalysers
- Introduction to chromatography
- Study of tissues smear
- Staining of tissues smear

BVMLTP-502-Parasitological & Virology

- Routine examination of feces.
- Gross examination and physical examination of stool.
- Concentration method of microscopic stool examination
- Microscopic examination of stool specimen.
- Microscopic examination of stool specimen.
- Detection of malarial parasite
- Detection of trypanosomes(the causal agent of sleeping sickness)
- Laboratory diagnosis of kala azar
- Laboratory diagnosis of microfilaria(wuchereeia bancrofti)
- Quantitative determination of serum (or plasma) igG class
- antibodies to toxoplasma gondii by ELISA
- Determination of IgM class antibodies to toxoplasma gondii by ELISA

BVMLTP-503-Endocrinology,Tumor and cancer markers

1. To determine T3 conc. in serum sample.
2. To determine T4 conc. in serum sample.
3. To determine TSH conc. in serum sample.
4. To determine LH conc. in serum sample.
5. To determine FSH conc. in serum sample.
6. To determine Prolactin conc. in serum sample.
7. To determine TSH conc. in serum sample.
8. To perform TRIPLE test.
10. Beta HCG

BVMLTP-504-Advance Bio-Chemical Testing Techniques

- Chromatography technique
- Paper Chromatography, Thin layer chromatography, HPLC, Gas liquid chromatography, Ion exchange chromatography
- Phospholipids differenciation
- Lactic acid formation
- Starch formation

BVMLTP-505-Practical digital litracy and financial literacy

- Uses Advance options in MS excel
- Excel
- Power point
- Using internet-based learning platform
- Using google and you tube for learning
- Using smart phone to become smart
- Using internet for personal requirement
- Online payments method
- Use of social media for advisement

SEMESTER 6

BVMLT -601-Food and industrial microbiology

UNIT-1

Food Microbiology: Food as a substrate for microorganisms, nutritive value of food stuffs, effect of hydrogen ion concentration, moisture requirement on food, important food borne diseases example staphylococcal intoxification, salmonellosis, shigellosis, qualitative and quantitative analysis of food components(protein, fats, lipids, carbohydrates), microbiological examination of food products incliding dairy products, food poisoning caused by bacteria and fungi.

UNIT-2

Contamination, preservation and spoilage of food: contamination, preservation and spoilage in various foods viz. cereals and cereal products (cereal grains, flour, bread, pasta, macroni), sugars and sugars products (maple, syrup, honey, candy), vegetables and fruits, meat (fresh meat, fresh beef, hamburger, fish), milk and milk products (cheese, butter).

UNIT-3

Production strains isolation and screening techniques: production strains isolation and screening techniques, preservation and genetic modification of industrial microorganisms, fermentation media, characteristics of ideal production media, common substrates used in ideal fermentations, batch andcontinuous fermentations,

UNIT-4

Fermentation products: yeast and its uses, fermentation of beer, wine and alcohol, production of organic acids viz. acetic acid, lactic acid, propionic and butyric acid and mixed acids. Mass transfer in aerobic fermentation.

Reference book: *[Burton's microbiology for the health science, the science of laboratory diagnosis, C.P Baveja,* "A Textbook of Basic and Applied Microbiology" by K R Aneja]

BVMLT -602-Clinical lab operation and management

UNIT-1

Reagent preparation: The metric system, preparation of molar, normal percent solutions buffers, acid, base, pH (Definition and examples) lab calculations and graphs, clinical sample collection e.g. blood, urine, stool examination, saliva sample, sputum sample, semen analysis etc.

UNIT-2

Preparation and maintaining lab records: labelling of sample, (making entries, storage, annexes), management of histopathology records, reporting result, basic format of a test report, release of examination results, alteration in reports, quality management system, internal and external quality control.

UNIT-3

Biomedical waste management in a clinical laboratory: Disposal of used samples, reagents and other biomedical waste, calibration and validation of clinical laboratory instruments.

UNIT-4

Ethics in medical laboratory practice: Pre examination procedures, examination procedures, reporting of results, preserving medical records, access to medical laboratory records, audits in a medical laboratory, documentation.

Reference book: *[Godkar, Henry's clinical diagnosis and management by laboratory methods]*

PRACTICALS:

BVMLTP -601Food and industrial microbiology

- Quantitative examination of microbial types in raw
- processed preserved food stuffs.
- Direct microscopic determination of bacteria in raw,
- pasteurized milk and reductase test
- Various biochemical tests and their importance in Food Microbiology

BVMLTP -602-Clinical lab operation and management

- standards for a clinical laboratory professional duty to the patient
- Good Laboratory Practice (GLP
- National and International Agencies for clinical laboratory accreditation
- Safety in a clinical laboratory, General safety precautions.
- Patient management for clinical samples collection,
- transportation and preservation,
- Sample analysis
- Quality Management system
- procedures, reporting of results, preserving medical records
- Planning, Horizontal, Vertical and Test audit, Frequency of audit, Documentation