Rani Durgavati Vishwavidyalaya, Jabalpur
Faculty of Life Sciences
Under the CBCS scheme (Ordinance 14)
Bachelor of Vocation in Medical Laboratory Technology
Year 2 (Advance Diploma) Semester IV

Microbiology-II

Course Code: VMLT-403

Course Ojective: The theoretical basis of the tools, technologies and methods common to microbiology; and. demonstrate practical skills in the use of tools, technologies and methods common to microbiology, and apply the scientific method and hypothesis testing in the design and execution of experiments.

Course learning Outcome: Students would be able to identify and differentiate bacteria and fungus in biological samples. This paper encompasses the basic study and understanding of the various microbiological practicals as well as their laboratory investigations.

Course Content:

Unit-I- Lab organization, management, recording of results and quality control in Medical Microbiology Lab. Safety measures in Microbiology Laboratory, Occurrence of lab infections, route of infections in laboratory, safety measures precaution in use of pathogens in teaching.

Unit-II- Host pathogen interaction: Definitions - Infection, Invasion, Pathogen, Pathogenicity, Virulence, Toxigenicity, Carriers and their types, Opportunistic infections, Nosocomial infections. Transmission of infection

Unit-III- Principle, working, use, care & maintenance of Laminar air flow, Centrifuge, Autoclave, hot air Oven, Incubator, Colony Counter, Muffle Furnace, Mac-intos Field-jar etc. Sterility testing of I/v fluids, Collection, transportation and processing of I/v fluids for bacterial contamination, Recording the result and interpretation

Unit-IV- Hospital acquired infection, Specimen collection from patients, clinics and hospitals, Specimen collection for epidemiological investigations, role of microbiology laboratory in control of nosocomial infection Antimicrobial agents and Antibiotics: Introduction, mechanism of action, classification and uses, Antibiotic susceptibility testing in bacteriology, Culture medium used for Antibiotic susceptibility testing, Preparation and standardization of inoculums, Control bacterial strains, Description, morphology, cultural characteristics, pathogenecity, cultural characteristics, clinical features and lab diagnosis of Staphylococcus, Streptococcus, Pneumococcus, Neisseria, Bordetella, Choice of antibiotics MIC and MBC: Concepts and methods for determinationVarious methods of Antibiotic susceptibility testing with special reference to Stokes and Kirby-Bauer method

Unit-V- Description, morphology, cultural characteristics, pathogenecity, cultural characteristics, clinical features and lab diagnosis of Clostridia, Escherichia coli, Salmonella,Shigella, Proteus, Vibrio, Pseudomonas, Spirocheates, Chlamydia, Actinomyces, Rickettsia,Yersenia, Brucella, Description, morphology, cultural characteristics, pathogenecity, cultural characteristics, clinical features and lab diagnosis of Vibrio, Pseudomonas, Spirocheates, Chlamydia, Actinomyces, Rickettsia,Yersenia, Brucella, Introduction of Mycology: Definition, general properties and classification Cutaneous mycoses, Systemic mycoses, Opportunisticmycoses Culture and laboratory test for fungus.

Suggested Readings

1. Adelberg's Medical Microbiology. 26th edition. McGraw Hill Publication
2. Goering R., Dockrell H., Zuckerman M. and Wakelin D. (2007) Mims' Medical Microbiology. 4th edition. Elsevier
3. Willey JM, Sherwood LM, and Woolverton CJ. (2013) Prescott, Harley and Klein's

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Immunology& Serology-II

Course Code: VMLT-404

Course Objective: This paper will provide knowledge of serological techniques, autoimmune disorders their markers and vaccines.

Course learning Outcome: Students will able to carry out differential diagnosis of disease by the help of serological techniques. To impart knowledge of the basic principles of bacteriology, virology, mycology, immunology and parasitology including the nature of pathogenic microorganisms, pathogenesis, laboratory diagnosis, transmission, prevention and control of diseases common in the country.

Course Content:

Unit- I

Western blotting, Southern blotting, Northern blotting Immunodiffusion, Immunoelectrophoresis, Hypersensitivity and its types Introduction to Allergy and its laboratory test

Unit-II

Introduction of transplant immunology, graft rejection, tissue typing for kidney and bone marrow transplant, Laboratory test for transplant.

Unit –III

Autoimmune disorders, pathogenesis, organ specific and systemic autoimmune disorders and its markers such parietal cell antibody, anti sperm antibody, lupus anticoagulants, anti mitochondrial antibody, ANA, ds DNA, HLA-B27, ASMA, anti CCP

Unit-IV

Immunological disorders: primary and secondary immunodeficiency, SCID, AIDS, Tumour, types of tumours, Various Tumour Markers, their significance and method of estimation.

Unit-V

Vaccines, classification and applications, Active and passive immunization, Immunoprophylaxis schedule in neonates, children and in pregnancy

Suggested Readings:

1. Abbas AK, Lichtman AH, Pillai S. (2007). Cellular and Molecular Immunology. 6th edition Saunders Publication, Philadelphia.
2. Delves P, Martin S, Burton D, Roitt IM. (2006). Roitt's Essential Immunology.11th edition Wiley- Blackwell Scientific Publication, Oxford.
3. Goldsby RA, Kindt TJ, Osborne BA. (2007). Kuby's Immunology. 6th edition W.H. Freeman and Company, New York.
4. Murphy K, Travers P, Walport M. (2008). Janeway's Immunobiology. 7th edition Garland Science Publishers, New York.
5. Peakman M, and Vergani D. (2009). Basic and Clinical Immunology. 2nd edition Churchill Livingstone Publishers, Edinberg. Richard C and Geiffrey S. (2009). Immunology. 6th edition. Wiley Blackwell Publicatio

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Year 2 (Advance Diploma) Semester IV
Histopathology & Histotechniques-II

Course Code: VMLT-407

Course Objective: This paper aims to understand the principle, procedure & demonstration of various tissue constituents and advance tools.
Course learning Outcome: Students would be able to perform various staining techniques and understand principle and application of various techniques.
Course Content:

Unit-I
Staining of carbohydrates: preparation of Schiff reagent, PAS staining, Alcian blue, staining of glycogen, Amyloid, other staining method
Connective tissue & its staining: Trichrome staining, verhoeff stain, Weigert Resorcin stain, Gordon's and Sweet stain, Gomori's method, von Geison stain, PTAH stain

Unit-II
Demonstration of minerals and pigments in tissue sample, Demonstration and identification of lipids, Demonstration of enzymes, diagnostic application and the demonstration of phosphatases, dehydrogenases, oxidases and peroxidases, Demonstration of microorganism on tissue specimens, Bacteria, AFB, Actinomyces, spirochetes, fungi

Unit-III
Demonstration of nucleic acids, Processing and staining of bone marrow sample. Fixation, Processing and section cutting of bones, eye ball, Techniques in neuropathology: Neurons staining, Myelin, Neuropathology lab specimen handling

Unit-IV
Demonstration of sex chromatin, Museum techniques

Electron microscopy: Principle and working, fixation, processing and staining of tissue Fluorescence Microscope: Principle and working

Unit- V
Immunohistochemistry: principle, types, applications, antigen retrieval, APAAP, PAP Staining, Quality control in histopathology

Suggested Readings:

1. Bancroft's Theory and Practice of Histological Techniques, 7th Edition, Elsevier Publications
2. Harshmohan (2017), Textbook of Pathology, 7th edition, Jaypee Publications
3. Godkar.B. Praful,(2016) Textbook of MLT,3rd edition,Bhalani Publications
4. C F A Culling,(1974),Handbook of Histopathological and Histochemical Techniques: Including Museum Techniques,3rd edition, Butterworths Publishers

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SKILL DEVELOPMENT MODULE-IV
(COMMUNICATION SKILLS)

Course Code – SDC104
Learning Objective (LOs):

- Students will be able to understand and apply knowledge of human communication and language processes as they occur across various contexts, e.g., interpersonal, intrapersonal, small group, organizational, media, gender, family, intercultural communication, technologically mediated communication, etc. from multiple perspectives.
- Students will develop knowledge, skills, and judgment around human communication that facilitate their ability to work collaboratively with others. Such skills could include communication competencies such as managing conflict, understanding small group processes, active listening, appropriate self-disclosure, etc.
- Students will be able to communicate effectively orally and in writing.

Learning Specific Outcomes (LSOs):

After the completion of the course, the Students will be able to:

- Understand the role of communication in personal & professional success.
- Develop awareness of appropriate communication strategies.
- Prepare and present messages with a specific intent.
- Analyze a variety of communication acts.
- Ethically use, document and integrate sources.

Course Outcomes:

- To develop Professional Communication skills and be an effective goal oriented team player.
- To develop communication and problem solving skills.
- To re-engineer attitude and understand its influence on behavior.

UNIT I

1. Communication, Models of communication, Channels of communication & its type, Types of communication channel
   a. Face-to-Face
   b. Broadcast Media- TV, radio and loud speakers
   c. Mobile
   d. Electronic
   e. Written
2. Medium of communication, Type of communication-Verbal, Non-verbal communication and its type, Non-Verbal Communication-its importance and Nuances FacialExpression,Posture,Gesture,eye-contact,Appearance(DressCode)

UNIT II

3. Barriers of communication
4. Communication and soft skill
   i. Practiceon: Oral/spokencommunicationskill&testing-voiceandaccent,voiceclarity,voice modulation&intonation,wordstressetc.
   ii. Feedback&questioningtechnique: Objectivenessinargument(Bothoneononeandingroups)

UNIT III

1. 5Ws&1H
2. 7 CsforeffectiveCommunication
   b. Correctness
   c. Clarity

d. Conciseness
e. Completeness
f. Consideration
g. Concreteness
h. Courtesy

3. Etiquetteandmanners
4. Seven steps of effective communication -Step 1: Listening,Step 2: Talk brief., Step 3: Consider using names, Step 4: Talk confidently, Step 5: Use non-verbal communication to send your message effectively, Step 6: Take care of your language and jargon, Step 7: Create a level of comfort.

UNIT IV

1. Listening-it'simportance,Goodandbadlistening
2. Self management:
   i. Self-Evaluation:Identifyingone'sstrengthandweakness
   j. Self-discipline:Planning&Goalsetting
   k. Self-criticism:Managingself-emotions,ego,pride
   l. Recognitionofone'sownlimitsand deficiencies
3. Formal Communication Channels
4. Informal Communication Channels
5. Unofficial Communication Channels
6. Types of Communication Medium
   m. Physical media
      i. Large meetings, town hall meetings
      ii. Department meetings (weekly meetings)
      iii. Up close and personal (exclusive meetings)
      iv. Video conferences
      v. Viral communication or word of mouth
   n. Mechanical media
      i. E-mail
      ii. Weekly letters or newsletters
      iii. Personal letters
      iv. Billboards
      v. Intranet
      vi. Magazines or papers
      vii. Sms/Social media

UNIT V

1. Concept to effective Communication- Conviction, Confidence, Enthusiasm
2. Business Letter writing
   o. SalesLetters. ...
   p. Order Letters. ...
   q. Complaint Letters. ...
   r. Adjustment Letters. ...
   s. Inquiry Letters. ...
   t. Follow-Up Letter. ...
   u. Letters ofRecommendation. ...
   v. Acknowledgment Letters.
3. Project Work, Assignment& Practical Training on Communication Skill

References –

Interpersonal Skills (Hindi) (English, Paperback, Rastogi Kriti)
Communication Skills" by Sanjay Kumar and Pushp Lata
Hasson, Gill. Brilliant Communication Skills. Great Britain: Pearson Education, 2012.References:
Web Links

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Practical syllabus

CODE- VMLT-405 (Clinical Haematology-II)

1. Staining of bone marrow
2. To perform sickling test.
3. To determine fetal haemoglobin
4. To perform Heinz bodies
5. Demonstration of leukemic slides
6. To perform LAP scoring
7. To determine total platelet count
8. To perform PT and APTT
9. To perform thrombin time.
10. To perform D-dimer test.
11. To determine fibrinogen conc.
12. General blood Picture and demonstrate malarial slide
13. Haemoglobin electrophoresis
14. Demonstration of hemoparasites like trypanosomes , Filaria, Malaria

CODE- VMLT-406 (Microbiology, Immunology & Serology-II)

1. Demonstration of Autoclave and sterilization of media
2. Antibiotic sensitivity test.
3. Microscopic examination of urine
4. Examination of urine
5. Examination of sputum
6. To perform HIV Tridot test.
7. To perform radial immunodiffusion test.
8. To perform immunoprecipitation method.
9. To perfrom HBsAg rapid test.
10. To perform ASO test
11. To perform ELISA test.
12. To perform TB IgG & IgM test
13. To perform Dengue IgG & IgM test
14. To perform typhidot test.
15. Introduction of Allergy panel
16. Montoux test

CODE- VMLT-408 (Histopathology & Histotechniques-II)

1. Grossing of tissue
2. To perform tissue processing by manual method.
3. To perform section cutting of paraffin embedded tissue.
4. To fix the smear on glass slide.
5. To perform hematoxylin and eosin staining.
6. To perform PAS staining.
7. To perform AFB staining

- Students shall be deputed to various labs of Pathology/ Medical laboratory /Clinical Technology department where they shall undergo practical based training. Student's performance shall be evaluated on continuous basis by the faculty posted in various sections. The faculty shall submit the assessment records of each student posted in his/her section on the basis of HOD.
- As per practical students should give 200 hrs. of medical internship training in fourth semester then their program is valid.

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Year 3 (B.Voc.-Degree) Semester V

SCHEME

Sl.	Course Code	Subject	L	P	Credit	Evaluation Scheme		
						Internal	External	Total
SKILL COMPONENT								
1	VMLT -501	Immunohematology & Blood Banking	4	-	4	40	60	100
2	VMLT -502	Clinical Enzymology & Automation	4	-	4	40	60	100
3	VMLT- 503	Parasitology & Virology	4	-	4	40	60	100
4	VMLT -504	Diagnostic Cytology	4	-	4	40	60	100
5	VMLT -505	Practical: Clinical Enzymology	-	2	2	40	60	100
6	VMLT- 506	Practical: Parasitology & Virology	-	2	2	40	60	100
7	VMLT-507	Practical:-Diagnostic Cytology	-	2	2	40	60	100
GENERAL COMPONENT								
8	VMLT -508	Principles of Lab Management & Medical Ethics	4	-	4	40	60	100
9	SDC-105	Skill Development Module-V	4	-	4	40	60	100
10	VMLT-509	Comprehensive Viva Voce (CVV)	-	4	4		100	100
		Total	24	10	34	360	640	1000

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Year 3 (B.Voc.-Degree) Semester V
Immunohematology & Blood Banking

Course Code – VMLT-501

Course Objective: The prime concern of this subject to learn about the concept of blood grouping, blood collection, infectious markers determination, compatibility testing and quality control involved in blood transfusion services. . In the laboratory, students devote time to quality control, compatibility testing, patient antibody identification, and blood component therapy.

Course learning Outcome: Students will be able to understand the basics of transfusion medicine, laboratory testing, quality control and apheresis techniques. Students focus on the theory of antigen-antibody reactions, genetics of blood group inheritance, and the concept of donor/patient compatibility.

Course Content:

Unit-I

Basic Principles of Blood Banking, Antigen, Antibody, naturally occurring antibody, Complement, ABO & Rh blood group system, Methods of blood group determination, Forward and Reverse grouping, Slide & Tube method, Gel method.

Unit-II

Other blood group system such as Lewis, MNS, Kell Duffy etc. Anticoagulants and preservative used in blood bank, Donor selection criteria, Blood collection and processing

Unit-III

Transfusion transmissible infectious disease screen, Coomb'test, Cross matching, Compatibility testing, Antibody Screening & Identification, Grading of Reaction/Agglutination

Unit-IV

Blood components and its preparation, preservation, storage and transportation
Indications for different blood component transfusion, Blood transfusion reaction and its type, HDN Introduction of stem cell banking and bone marrow transplantation.

Unit-V

Apheresis, indications of hemapheresis, plasmapheresis, plateletspheresis, plasmapheresis Quality control of reagents, equipments, blood components used in transfusion medicine. Role of NACO, Indian Red Cross Society, DGHS and blood transfusion services.

Suggested Readings:

1. Godkar.B. Praful,(2016) Textbook of MLT,3rd edition,Bhalani Publications
   Ochei J & Kolhatkar A(2000),Medical Laboratory Science: Theory & Practice, 3rd edition,Mcgraw Hill Education
2. Mukherjee .L.K(2017). Medical Laboratory Technology,Vol.1-3,3rd edition, Tata Mcgraw Hill
3. Sood Ramnik,(2015). Text book of Medical Laboratory Technology,2nd edition, Jaypee Publications
4. Wintrobe's Clinical Hematology,(2014).13th edition, Lippincott Williams & Wilkins

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Year 3 (B.Voc.-Degree) Semester V
Clinical Enzymology & Automation

Course Code – VMLT-502

Course Objective: This course has been formulated to impart comprehensive knowledge of enzymes and automation in Clinical Laboratory.

Course learning Outcome:

Understand the concept of Biochemistry regarding Biomolecules Carbohydrates, proteins, lipids, Nucleic acids, Enzymes, Minerals. II. Have knowledge of intermediary metabolism of the above & regulation of individual metabolism.III. Possess the knowledge of the impairment of metabolism including inborn errors of metabolism.
IV. Understand the role of nutrition in health& disease.

Course Content

Unit-I

Introduction to enzymes, Classification of Enzymes, Isoenzymes, Concept of lock and key and induced fit theory, concept of activation energy and binding energy. Factors affecting enzyme activity

Unit-II

Coenzyme: Classification, various types and function, structure of NAD+, NADP+, FAD and FMN, PPP. Units for measuring enzyme activity, factors affecting enzyme level in serum/ plasma. Clinical assay & its type, kinetic assay and end point assay for the enzymes

Unit-III

Enzyme kinetics, the Michaelis-Menten equation and its physiological significances, Enzyme Inhibition, types of inhibitors of enzyme

Unit-IV

Isoenzymes, their tissue distribution and clinical significance: ALT, AST, ALP, GGT, CPK, CK-MB, LDH,Troponin, Myoglobin, Amylase, Lipase, ACP,

Unit-V

Basic Concepts of Automation, principle, working and maintenance of various clinical chemistry analyzers, point of care testing, Hospital Laboratory Management

Suggested Readings:

1. D M Vasudevan, (2011),Text book of Medical Biochemistry,6th edition Jaypee Publishers
2. M N Chatterjea & Rana Shinde,(2012),Text book of Medical Biochemistry,8th edition,Jayppe Publications
3. Singh & Sahni,(2008),Introductory Practical Biochemistry,2nd edition, Alpha science
4. Lehninger,(2013),Principles of Biochemistry,6th edition, W H Freeman
5. U Satyanarayan,(2008), Essentials of Biochemistry,2nd edition, Standard Publishers
6. Teitz,(2007),Fundamentals of Clinical Chemistry,6th edition,Elsevier Publications
7. Bishop(2013),Clinical Chemistry,7th edition, WileyPublications

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Year 3 (B.Voc.-Degree) Semester V
Parasitology & Virology

Course Code – VMLT-503

Course Objective: This paper aims to learn about introduction, general characteristics, life cycle and laboratory diagnosis of various medically important parasites. This course is aimed to provide the students with an introduction to the field of medical parasitology.

Course learning Outcome: Student will be able to identify various viruses with latest biomedical techniques and can demonstrate the diseases associated with them. It focuses on the parasitological terms, types of parasites, habitats, hosts and different life cycles. The classification of different parasites is also included.

Course Content:

Unit-I- Introduction of parasites, host, zoonosis, host parasits relationship, sources of infection, mode of infection, pathogenesis, immunity in parasitic infection, lab diagnosis

Protozoalogy:Entamoeba histolytica, Malarial Parasites, Leishmania, Trypanosomes, their morphology, life cycle, pathogenesis, clinical features and lab diagnosis.

Helminthology: Introduction and classification, Taenia solium, Taenia Saginata,Fasciola, Ascaris, Wuchereria bancrofti their morphology, life cycle, pathogenesis, clinical features and lab diagnosis. Hookworm, Trichuris. Dracunculus their morphology, life cycle, pathogenesis, clinical features and lab diagnosis.

Unit-II- Diagnostic methods in Parasitology: Introduction, Examination of stool, urine, blood, Culture methods, Immunological diagnosis and serology

Unit III- Nature and Properties of Viruses

Introduction: Discovery of viruses, nature and definition of viruses, general properties, concept of viroids, virusoids, satellite viruses and Prions. Structure of Viruses: Capsid symmetry, enveloped and non-enveloped viruses Isolation, purification and cultivation of viruses

Viral taxonomy: Classification and nomenclature of different groups of viruses, Modes of viral transmission: Persistent, non-persistent, vertical and horizontal Viral multiplication and replication strategies: Interaction of viruses with cellular receptors and entry of viruses. Assembly, maturation and release of virions

Unit- IV

Poxviruses, Herpesviruses, hepaptitis viruses, retroviruses-HIV, Picorna viruses, rhabdoviruses, orthomyxoviruses and paramyxo viruses, TORCH profile,Symptoms, mode of transmission, prophylaxis and control of Polio, Herpes, Hepatitis, Rabies, Dengue, HIV, Influenza with brief description of swine flu, Ebola, Chikungunya, Japanese Encephalitis

Unit V

Introduction to oncogenic viruses, Types of oncogenic DNA and RNA viruses, concepts of oncogenes and proto-oncogenes, prevention & control of viral diseases, antiviral compounds and their mode of action, interferon and their mode of action, General principles of viral vaccination

Suggested Readings:

1. Ananthanarayan R. and Paniker C.K.J. (2009) Textbook of Microbiology. 8th edition, University Press Publication
2. Brooks G.F., Carroll K.C., Butel J.S., Morse S.A. and Mietzner, T.A. (2013)
3. Adelberg's Medical Microbiology. 26th edition. McGraw Hill Publication
4. Goering R., Dockrell H., Zuckerman M. and Wakelin D. (2007) Mims' Medical Microbiology. 4th edition. Elsevier

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Year 3 (B.Voc.-Degree) Semester V
Diagnostic Cytology

Course Code – VMLT-504

Course Objective: The students will learn about various staining procedures for demonstration of different substances & various cytological investigations. This will include special staining procedures &handling & testing of various cytological specimens.

Course learning Outcome: Students will be able to perform collection, processing, staining and quality control in cytological diagnosis.

Course Content:

Unit-I

Cell: basic structure and function, cell organelles, cell cycle, Benign and Malignant tumors, Instruments used in cytology, preparation of buffers, stainsMicroscopy: Light, compound, phase contrast, fluorescence

Unit- II

Instruments and equipments used in cytology Fixation and Fixatives used in cytology, Adhesive and mounting media, Cell block and cytospin technique,
Staining such as PAP, Diff-quick, MGG, H&E, Shorr staining, significance of PAP-HPV, Destaining and restaining of slides, Cover slipping

Unit-III

Aspiration and exfoliative cytology, Patient preparation, Sample collection, Fixation, Processing and Staining FNAC, collection, processing of sample and staining, on site quick staining procedure

Unit-IV

Pap staining, Progressive & Regressive, Hormonal cytology in different age groups,Collection and processing of sputum, BAL, CSF, Pleural, peritoneal and pericardial fluid, Gynaecologic sample

Unit-V

Sex chromatin demonstration, Introduction of Immunocytochemistry, different markers and its applications, Automation in cytology, Liquid based preparation & automated screening device

Suggested Readings:

1. Bibbo, (1997),Comprehensive Cytopathology,2nd edition, Saunders Publishers
2. Koss's Diagnostic Cytology,Vol.1 & 2,(2006),5th edition, Lippincott

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Year 3 (B.Voc.-Degree) Semester V
Principles of Laboratory Management & Medical Ethics

Course Code – VMLT-508

Course Objective: The students will be made aware of the basic ethics, good lab practices including awareness/ safety in a clinical lab.

Course learning Outcome: Students would be competent enough to understand sample accountability, quality management system, biomedical waste management, calibration and validation of clinical laboratory instruments, Laboratory Information system (LIS), Hospital Information system (HIS) and financial management.

Course Content:

Unit-I

Ethical Principles and standards for a clinical laboratory professional duty to the patient, duty to colleagues and other professionals, Good Laboratory Practice (GLP) ,Introduction to Basics of GLP and Accreditation, Aims of GLP and Accreditation, Advantages of Accreditation, Brief knowledge about National and International Agencies for clinical laboratory accreditation

Unit-II

Awareness/Safety in a clinical laboratory, General safety precautions.
HIV: pre- and post-exposure guidelines, Hepatitis B & C: pre- and post-exposure guidelines, Drug Resistant Tuberculosis
Patient management for clinical samples collection, transportation and preservation, Sample accountability, Purpose of accountability, Methods of accountability

Unit-III

Sample analysis: Introduction, factors affecting sample analysis, reporting results, basic format of a test report, reported reference range, clinical alerts, abnormal results, results from referral laboratories, release of examination results, alteration in reports

Unit-IV

Quality Management system: Introduction, Quality assurance, Quality control system, Internal and External quality control, quality control chart Biomedical Introduction and importance of calibration and Validation of Clinical Laboratory instrument Ethics in Medical laboratory Practice, Ethics in relation to Pre-Examination procedures, Examination procedures, reporting of results, preserving medical records Procurement of equipment and Inventory Control,

Unit-V

Audit in a Medical Laboratory, Introduction and Importance, NABL & CAP, Responsibility, Planning, Horizontal, Vertical and Test audit, Frequency of audit, Documentation

Suggested readings:

1. Teitz,(2007),Fundamentals of Clinical Chemistry,6th edition, Elsevier Publications
2. Bishop(2013),Clinical Chemistry,7th edition, Wiley Publications
3. Henry's Clinical Diagnosis and Management by Laboratory Methods,(2011),22nd edition, Elsevier

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Year 3 (B.Voc.-Degree) Semester V
SKILL DEVELOPMENT MODULE-V
(DIGITAL LITERACY)

Course Code – SDC105

Learning Objective (LOs):

- Digitally literate learners learn to become independent, confident and discerning users of technology. Subsequently they acquire and develop critical and analytical attitudes to appropriately choose the right digital tools according to specific needs.
- Digital literacy includes five categories of digital competencies, namely: Information Management, Communication and Collaboration, Digital Media, Using Digital Tools for Learning, Management of the Internet.

Learning Specific Outcomes (LSOs):

After the completion of the course, the Students will be able to:

- Review, revise and evaluate information presented in a range of digital media.
- Understand both how and why messages in digital media are constructed and for what purposes.
- Examine how individuals interpret messages in digital media differently.
- Understand how values and points of view are included or excluded and how digital media can influence beliefs and behaviors.
- ethical / legal issues surrounding the access and use of digital media, including copyright, ownership, licensing and use of proprietary content or software.
- Student can express through digital media and technologies.
- Ethically use, document and integrate sources.

Course Outcomes:

- To develop Professional Digital skills.
- To develop communication and problem solving skills in Digital Prospects .
- To re-engineer attitude and understand its influence on behaviour.

UNIT I

INTRODUCTION & IMPORTANCE

Introduction of Digital Literacy , Aims , Need of Digital Literacy, Importance of Digital Literacy Skills in everyday life, & Advantages for a students or progression to employment. Changes brought about by the 'Digital Revolution' of the 1980s; Development of Digital Skills can help them with progression to employment; Digital Literacy Skills.

UNIT II

BASIC OPERATIONS AND CONCEPTS -Identify and define basic computer terminology (e.g., hardware, software, operating system, network). Main parts of a computer. Types of networks. Manage files and folders.

INTERNET BASICS- Identify and define basic Internet terminology (e.g., World Wide Web, browsers, Internet, intranet, search engine, cloud computing). How e-mail works. Send an e-mail message with an attachment. Identify e-mail etiquette. Features of social networks. Internet to complete real-life tasks (e.g., date-time-weather, travel information, product purchase, financial information, transactions performed over the Web).

UNIT III

DIGITAL IDENTITY-Digital identity build a positive profile online . Employers and. university admissions tutors will look digital identity when apply for a job or a university place. And it's importance

DIGITAL ATTRIBUTES AND SKILLS - Characteristics and Behavior of a digital consumer, digitally confident when dealing with online money matters; practice safe online shopping, online banking and online payment; difference between shopping for 'goods' and paying for digital downloads and streaming; aware of responsible online behavior understand what is involved when buying a mobile phone; identify a range of apps used on a mobile phone.

UNIT IV

SOCIAL MEDIA LITERACY -Social Media available today and the positive and negative impact that technology can have on us as individuals and as a society. Send and Receive information through Social Media. The types of social media (face book, whatsapp , messengers , twitter , LinkedIn ,etc)

ONLINE BANKING-, ATM card,Mobile banking , Password Security and ATM withdrawal, Book Airlines, Train and Bus tickets, PAYTM ,etc.

UNIT V

SAFETY AND ETHICS - E-Safety and ethical online behavior; concept of 'safeguarding' and the responsibility of all to safeguard each other; critical and evaluative skills online;,inappropriate use of social media; identify what constitutes e-crime.Options in dealing with Virus attacks.Identify potential abuse and unethical uses of computers and networks. Explain the consequences of illegal, social, and unethical uses of information technologies, e.g., piracy; illegal downloading; licensing infringement; and inappropriate uses of software, hardware, and mobile devices. Importance of cyber safety and the impact of cyber bullying.

Assignments & Practical Aspect of Digital Literacy.

References –Gilster, P. (1997). *Digital literacy*. New York: Wiley Computer Publishing.

Anderson, C. (2000). *Using digital cameras for classroom projects* . Retrieved from http://www.4teachers.org/techalong/anderson/index.shtml

Blair-Black, N. (2011). *Digital storytelling: Animated PowerPoint tutorial*. Retrieved from http://www.youtube.com/watch?v=PihHZF732BY

Blanchard, J., and Moore, T. (2010).*The digital world of young children: Impact on emergent literacy* [White paper]. New York: Pearson Foundation. Retrieved from http://www.pearsonfoundation.org/literacy/research-surveys-and-reports/the-digital-world-of-young-children-emergent-literacy.html

Educause Learning Initiative. (2007). *7 things you should know about digital*

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Under the CBCS scheme (Ordinance 14)
Bachelor of Vocation in Medical Laboratory Technology
Year 3 (B.Voc.-Degree) Semester V
Practical Syllabus

Course Code – VMLT-505 (Clinical Enzymology)

1. To perform enzyme estimation of LFT
2. To perform enzyme estimation of Cardiac profile
3. Determination of Troponin I
4. To perform enzyme estimation of Pancreatic disorder
5. To perform estimation of ACP.
6. Antenatal profile
7. Estimation of bicarbonate
8. Arterial blood gas analysis
9. Determination of Calcium
10. Creatinine and urea clearance test

VMLT-506 (Practical Parasitology & Virology)

1. Leishman staining for malarial parasites
2. Demonstration of permanent slide of Trichuris, Ascaris and Hookworm
3. Saline wet mount for observing ova and eggs of parasites.
4. Iodine wet mount for observing ova and eggs of parasites.
5. Concentration of stool samples byfloatation method
6. Zinc sulphate conc. Method for stool sample
7. Demonstration of various parasites bypermanent slides.
8. Concentration of stool sample bysedimentation method
9. Serologicaldiagnosisof Leishmania
10. Aldehyde Chopra test for Kala Azar
11. To perform HBsAg/ Australia Ag by rapid method
12. To perform HBsAg by ELISA
13. To perform HIV Tridot method.
14. To perform HIV by ELISA
15. To perform Dengue IgG/IgM
16. To perform TORCH profile
17. Demonstration of PCR HBV
18. Demonstration of PCR HIV Viral load

VMLT-507 (Practical Diagnostic Cytology)

1. Preparation of various cytological fixatives
2. Preparation of various stains used in cytology
3. Preparation of smear
4. To perform PAP staining
5. To perform Giemsa staining on fluid sample
6. To prepare cell suspension
7. Processing of various fluid samples

- Students shall be deputed to various labs of Pathology/ Medical laboratory /Clinical Technology department where they shall undergo practical based training. Student's performance shall be evaluated on continuous basis by the faculty posted in various sections. The faculty shall submit the assessment records of each student posted in his/her section on the basis of HOD.
- As per practical students should give 200 hrs. of medical internship training in fifth semester then their program is valid.

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Bachelor of Vocation in Medical Laboratory Technology

Year 3 (B.Voc.-Degree) Semester VI
SCHEME

Sl.	Course Code	Subject	L	P	Credit	Evaluation Scheme		
						Internal	External	Total
	SKILL COMPONENT							
1	VMLT- 601	Clinical Endocrinology & Toxicology	3	-	3	40	60	100
2	VMLT- 602	Advanced Diagnostic Techniques	3	-	3	40	60	100
3	VMLT- 603	Practical: Clinical Endocrinology & Toxicology		1	1	40	60	100
4	VMLT- 604	Practical: Advanced Diagnostic Techniques		1	1	40	60	100
5	VMLT- 605	Internship (Training)	-	6	6	-	200	200
6	VMLT- 606	Major Project	-	6	6	100	200	300
	GENERAL COMPONENT							
7	VMLT -607	Diagnostic Molecular Biology	3	-	3	40	60	100
8	VMLT- 608	Practical: Diagnostic Molecular Biology		1	1	40	60	100
9	SDC-106	Skill Development Module-VI	4	-	4	40	60	100
10	VMLT- 609	Comprehensive Viva Voce (CVV)	-	4	4		100	100
		Total	13	19	32	380	920	1300

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Bachelor of Vocation in Medical Laboratory Technology
Year 3 (B.Voc.-Degree) Semester VI
Clinical Endocrinology& Toxicology

Course Code – VMLT-601

Course Objective: This paper is framed to provide basic knowledge of hormones & toxic substances with their determination techniques as well as related disorders.

Course learning Outcome: Student will be able to understand after the exposure of the current paper students would be able to detect hormones and toxic substances in blood samples and also understand the basis of endocrine disorders.

Course Content:

Unit-I

Hormones, Classification of hormones, organs of endocrine system their secretion and function, regulation of hormone secretion, Mechanism of action

Unit-II

Thyroid function test: Thyroid hormones, biological function, hypothyroidism, hyperthyroidism, Determination of T_3, T_4, TSH, FT_3, FT_4, TBG, Disorder associated with thyroid dysfunction.

Unit-III

Infertility profile: LH, FSH, TSH, Estrogen, Progesterone, Total Testosterone, Free testosterone, DHEA-S, 17- Ketosteroids, Prolactin, their estimation and clinical significance, reference range, hypo and hyper secretion, Triple Test

Unit-IV

Growth hormone, ACTH, Aldosterone, Cortisol their estimation and clinical significance, reference range, hypo and hyper secretion

Unit-V

Introduction of Toxicology, Alcohol poisoning, Lead poisoning, Zinc poisoning, Mercury poisoning drugs abuse, screening procedure for drug screening, Spot tests, hair and urine test, Immunoassay for drugs.

Suggested readings:

1. Teitz,(2007),Fundamentals of Clinical Chemistry,6th edition,Elsevier Publications
2. Bishop(2013),Clinical Chemistry,7th edition, WileyPublications
3. Henry's Clinical Diagnosis and Management by Laboratory Methods,(2011),22nd edition, Elsevier
4. D M Vasudevan, (2011),Text book of Medical Biochemistry,6th edition Jaypee Publishers
5. M N Chatterjea & Rana Shinde,(2012),Text book of Medical Biochemistry,8th edition,Jayppe Publications
6. Singh & Sahni,(2008),Introductory Practical Biochemistry,2nd edition, Alphascience
7. Lehninger,(2013),Principles of Biochemistry,6th edition, W H Freeman

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Year 3 (B.Voc.-Degree) Semester VI
Advanced Diagnostic Techniques

Course Code – VMLT-602

Course Objective: This paper imparts the required skills for the detection of diseases, operation and application of various advance techniques.
Course learning Outcome: Students will be able to understand after the exposure of the current paper students would find themselves equipped with a full package of skill development in order to work in an advance diagnostic setting.
Course Content:

Unit-I
Chromatography, its principle, types and applications.
Paper Chromatography, Thin layer chromatography, HPLC, Gas liquid chromatography, Ion exchange chromatography and their application in diagnosis.

Unit-II
Basic Principle of electrophoresis, Paper electrophoresis, Gel electrophoresis, PAGE, SDS-PAGE, Agarose gel electrophoresis, buffer systems in electrophoresis.
Electrophoresis of proteins and nucleic acids, haemoglobin, immunoglobulin's, isoenzymes Applications of electrophoresis in clinical diagnosis.

Unit-III
Centrifugation, fixed angle and swinging bucket rotors , RCF and sedimentation coefficient, differential centrifugation, density gradient centrifugation andUltracentrifugation.

Unit-IV
Radioisotopes, Radioactivity, instruments for radioactivity measurement, applications of radioisotopes in clinical biochemistry

Unit-V
Immunoassay: ELISA, RIA, FIA, FACS and their applications in clinical diagnosis.

Suggested Readings:

1. Teitz,(2007),Fundamentals of Clinical Chemistry,6th edition, Elsevier Publications
2. Henry's Clinical Diagnosis and Management by Laboratory Methods,(2011),22nd edition, Elsevier
3. Singh & Sahni,(2008),Introductory Practical Biochemistry,2nd edition, Alphascience
4. Lehninger,(2013),Principles of Biochemistry,6th edition, W H Freeman
5. Wilson & Walker, Practical Biochemistry,2nd edition

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Year 3 (B.Voc.-Degree) Semester VI

Internship (Training)

Course Code – VMLT-605

Students shall be deputed to various labs of Pathology department wherein they shall undergo practical training of handling patients, collection and processing of blood, urine, sputum stool and body fluids samples.

Identification of patient's particulars based on CR number, Lab Number and transfer of samples from collection centres to different labs. Process of performing various tests in different labs. Each student is required to maintain a logbook of the various posting.

Student's performance shall be evaluated on continuous basis by the faculty posted in various sections. The faculty shall submit the assessment records of each student posted in his/her section on monthly basis to the HOD. Marks will be awarded out of 200.

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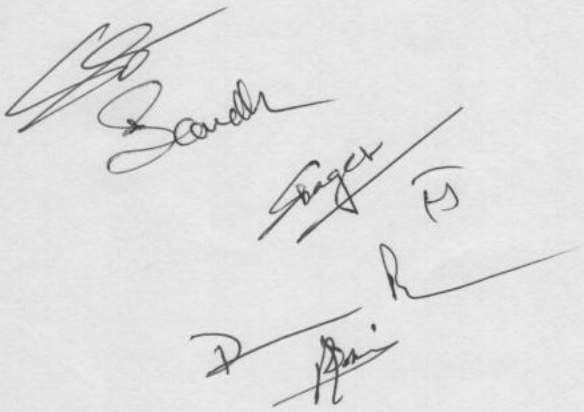

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Bachelor of Vocation in Medical Laboratory Technology
Year 3 (B.Voc.-Degree) Semester VI

Course Code – VMLT-606

Major Project

Student shall carry out the Major Project work in consultation with faculty and industrial partner organizations.

(Major Project work done by the student will be included in this semester for 300 marks. 200 marks for Project Work and 100 marks Internal assesment)

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Year 3 (B.Voc.-Degree) Semester VI
Diagnostic Molecular Biology

Course Code – VMLT-607

Course Objective: This syllabus provides a basic introduction of molecular biology and its techniques like PCR, RTPCR etc.

Course learning Outcome: Students will be able to rendered to take up their future molecular biology challenges and efficiently work in diagnostic molecular setup.

Course content:

Unit-I

Nucleic Acids, DNA, RNA, composition, structure, types, denaturation and renaturation of DNA, chemistry of DNA synthesis, general principles of replication, enzyme involved in DNA replication – DNA polymerases, DNA ligase, primase, telomerase and other accessory proteins.

Unit II

Basic transcription apparatus, Initiation, elongation and termination of transcription, Eukaryotic Transcription of mRNA, tRNA and rRNA, types of RNA polymerases, transcription factors Introduction of translation

Unit-III

Nucleic acid amplification testing, PCR, Principle, Types, applications, Thermal cycler, RT PCR, reverse transcriptase PCR, Nested PCR

Unit-IV

Blotting techniques, southern blotting and Western blotting
Introduction to chromosomes, its structure and disorder, Karyotyping, Chromosomal studies in hematological disorders (PBLC and Bone marrow), FISH

Unit-V

Radioisotopes and its application in measurement of blood volume, determination of red cell volume and plasma volume, red cell life span, platelet life span, radiation hazards and its prevention disposal of radioactive material
Introduction and applications of Flow cytometry, Stem cell banking, Prenatal Diagnosis

Suggested Readings:

1. Teitz,(2007),Fundamentals of Clinical Chemistry,6th edition,Elsevier Publications
2. Henry's Clinical Diagnosis and Management by Laboratory Methods,(2011),22nd edition, Elsevier
3. Singh & Sahni,(2008),Introductory Practical Biochemistry,2nd edition, Alphascience
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Bachelor of Vocation in Medical Laboratory Technology
Year 3 (B.Voc.-Degree) Semester VI
SKILL DEVELOPMENT MODULE-VI
FINANCIAL & BANKING EDUCATION

Course Code – SDC106

Learning Objective (LOs):

- Basic institutional and practical knowledge supported by text books including up-to-date information in the field of Finance & Banking Education.
- Recognize the role of saving money in reaching financial goals

Learning Specific Outcomes (LSOs):

After the completion of the course, the Students will be able to:

- Recognize the influence of one's financial preferences in financial decision-making.
- Examine personal habits, strengths, weaknesses and values when it comes to money .
- Identify common financial situations where decision-making may be influenced by external forces.
- Create a plan to create good money habits based on personality type and common external forces.
- Identify common situations where opposing financial preferences may result in conflict.
- Explain the role of financial preferences in relationships to others.

Course Outcomes:

- To develop Professional Finance & Banking Education skills.
- To develop communication and problem solving skills in Finance & Banking Prospects .

UNIT I

1. **Indian Banking System-**
2. **Types of banks in India**
   a. Commercial banks
      - Deposits

1. Saving banks
2. Current deposits
3. Fixed deposits
4. Seasonal deposits
5. Recurring deposits

- Loans and advancements
  1. Cash credits
  2. Overdrafts
  3. Loans
  4. Discounting bills

b. Co-operative Banks
c. Central Banks
   - Note issue
   - Credit control
   - it acts as a banker to the banks
   - it acts as a banker to the Government
   - it maintains the foreign exchange reserves of the country
   - it maintains the foreign Gold reserves of the country

d. Industrial Banks
e. Agriculture banks

f. Saving banks
g. Foreign exchange banks
h. Exchange banks
i. Private Banks

3. Financial Instruments:

a. Share, Debenture, Treasury Bills, Commercial Paper, Certificate of Deposits. Fix deposit Receipts.
b. Promissory note, Cheque, Bill of Exchange, Letter of Credit, Bank guarantee.

UNIT II

4.Acts relating to Banking & finance.

a. Reserve Bank of India Act. 1934
b. Banking Regulation Act.
c. Limitation Act.
d. Indian Partnership Act. Limited Liabilities Partnership Act.
e. Company Act
f. Negotiable Instrument Act.
g. SARFAESI (Securitization and reconstruction of Financial Assets and Enforcement of Security Interests) Act.
h. Debt Recovery Tribunal

UNIT III

5.Refinance Banks:

a. NABARD (National Bank For Agriculture And Rural Development)
b. IDBI (Personal & Corporate Banking|MSME& Agri banking)
c. SIDBI (Small Industries Development Bank Of India)
d. NHB (National Housing Banks)
e. MUDRA (Micro Units Development & Reliance Agency Ltd.)
    a. Pradhan Mantri MUDRA Yojna (PMMY)
f. EXIM Bank (Export Import Bank of India)

UNIT IV

6. Deposit Products:

a. Saving
b. Fixed & Recurring Deposits.
c. PPF, Sukanya Samridhi, NSC (National Saving Certificates) etc.

7. Loans & Advances facilities by Banks:

a. Different kinds of Loans and advances.
b. Securities & charges thereon.
c. Non-performing Assets.
d. Loan application & project preparing.

UNIT V

8. Balance sheet (Through Tally: computer application):

a. Different components of Balance Sheet.
b. Break-even point.
c. Ratio-analysis (Current Ratio; Debt–equity Ratio, Debt service Coverage Ratio etc)
d. Assignment & Practical Worksheets

References –

1. Indian Institute of Banking and Finance-February 2010
2. Bank Financial Management- Macmillan India Ltd

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Year 3 (B.Voc.-Degree) Semester VI
Practical Syllabus

VMLT-603 (Practical Clinical Endocrinology & Toxicology)

1. To determine T_3 conc. in serum sample.
2. To determine T_4 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.
9. Demonstration of male and female infertility test.
10. Beta HCG

VMLT-604 (Practical Advance Diagnostic Techniques)

1. To perform separation of amino acids by paperchromatography
2. To perform separation of amino acids by thin layerchromatography
3. To perform separation of DNA by Agarose gelelectrophoresis.
4. Separation of protein by PAGE
5. Separation of protein bypaper electrophoresis
6. Separation of haemoglobin

VMLT-608 (Practical Diagnostic Molecular Biology)

1. Isolation of DNA
2. Separation of DNA by Agarose gelelectrophoresis
3. Demonstration of thermal cycler and PCR.
4. HIV test by Western Blotting
5. To perform karyotyping
6. Demonstration of PCR HLA B-27
7. Demonstration of PCR HIV
8. Demonstration of PCR MTB

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