

PANJAB UNIVERSITY, CHANDIGARH-160014 (INDIA)

OUTLINES OF TESTS SYLLABI AND COURSES) OVERREADING 52-3.9814(R.786730

SCHEME of B.Voc.(MLT)

(SEMESTER SYSTEM)

***Refer to Generic Components Common to all B.Voc. Courses**

**** Summer Industrial Training of 4-6 weeks in a relevant Industry after 2nd Semester Examinations during summer break.
Training report by the student to be submitted within in one week of start of 3rd**

B.Voc. (Medical Lab Technology) SEMESTER V

B.Voc MLT SEMESTER I
BMLT Skill 103
BASICS OF HUMAN ANATOMY
Credits 6

Job Role: Medical Lab Technician

Objectives: Basic understanding of organization of body cells, tissues, organs, organ systems, and glands in human body

Instructions:

1. The syllabus of this paper has been divided into four units.
2. Examiner will set a total of nine questions comprising two questions from each unit, Question number one is compulsory of short answer type questions covering the whole syllabus.
3. The students are required to attempt one question from each unit and the entire Compulsory Question No. 1.
4. All questions carry equal marks

Section I

- Basic unit of body - Cell
- The anatomical organization of body cells, tissues, organs, organ systems, membranes and glands in human body.
- Introduction to different types of tissues: Anatomy, epithelial tissue, muscular tissue, nervous tissue
- Different types of organ systems.
- Brief Introduction of different types of body fluids, secretions and excretions
- Skeletal system: bones, joints and muscles.

Section II

Digestive Organs:

- Tongue
- Teeth
- Oral cavity
- Pharynx
- Oesophagus
- Stomach
- Small intestine
- Large intestine
- Liver, Pancreas and Spleen

Section III

Respiratory Organs-3.97879()-3.97879(h)0.128297()6.47276()-6.34454.60306(s)-8.33386(p)12.9N8.33386(o(r))-25.8824(y)25.7628()0.503802(a

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PRACTICAL: Study of various organs through Charts and models

Reference Books:

- | | |
|--|-------------------|
| 1. Anatomy & Physiology: | Ross and Wilson |
| 2. Anatomy and Physiology: | N Murgesh |
| 3. Anatomy and Physiology for nurses: | Evelyn Pearce |
| 4. Anatomy and Physiology for nurses : | Sears |
| 5. Anatomy and Physiology for nurses : | Pearson |
| 6. Human Anatomy: | Harie R. Berasari |

SECTION IV

9. Handbook of Biochemistry M.A. Siddique
10. Textbook of Medical Biochemistry S. Ramkrishnan
11. Biochemical Techniques K. Choudhary
12. Text book of Medical Biochemistry Chaterjee&Shinde
13. Principles of Biochemistry David L. Nelson
14. Principles of Biochemistry Lehninger
15. Textbook of Biochemistry and Human Biology G.P. Talwar
16. Textbook of Medical Laboratory Technology Godkar and Godkar
17. Outline of Biochemistry Conn Stumpf
18. Principles of Internal Medicine Isselbacher
19. Proteins and Proteomics : Laboratory Manual Richard J. Simpson
20. Purifying Proteins for Proteomics: Laboratory Manual Richard J. Simpson
21. Enzymes: Biochemistry, Biotechnology & Clinical chemistry, (2001) Palmer Trevor, Publisher: Horwood Pub. Co., England.
22. Outlines of Biochemistry: 5th Edition, Erice Conn & Paul Stumpf ; John Wiley and Sons, USA
23. Fundamentals of Biochemistry. 3rd Edition (2008), Donald Voet& Judith Voet , John Wiley and Sons, Inc. USA
24. Lehninger, Principles of Biochemistry. 5th Edition (2008), David Nelson & Michael Cox, W.H. Freeman and company, NY.
25. Biochemistry: 7th Edition, (2012), Jeremy Berg, LubertStryer, W.H.Freeman and company, NY
26. Biochemical Methods for Agricultural Sciences – Sadasivam and Manikam. Wiley Eastern Limited, 1992..
27. Practical Clinical Biochemistry Harold Varley, CBS; 6 edition (1 December 2006)
28. An Introduction to Practical Biochemistry (3rd Edition) – David T Plummer. Tata McGraw-Hill Publishing Company Limited, 1992.
29. Biometrics Identity by Sameer Nanawati
30. Medicinal Chemistry by AshutoshKar

SEMESTER II

B.Voc MLT

Skill BMLT 205 Paper - Analytical Laboratory Testing Process-I

Credits 6

Job Role: Medical Lab Technician

Objectives: To gain broad understanding of chemica

Practicals- All Biochemical tests mentioned in Theory
Reference Books

1. Textbook of Medical Laboratory Technology Godkar and Godkar
2. Research Methodology in Medical Sciences Chandorkar
3. Practical Clinical Biochemistry Harold Varley
4. Medical Laboratory Sciences, Theory & Practical A. Kolhatkar
5. Medical Laboratory Technology – Volume I Kanai Mukherjee
6. Medical Laboratory Technology – Volume II Kanai Mukherjee
7. Medical Laboratory Technology – Volume II Kanai Mukherjee
8. Medical Laboratory Technology Methods & Interpretation (5/e) RamnikSood
9. Enzymes: Biochemistry, Biotechnology & Clinical chemistry, (2001) Palmer Trevor, Publisher: Horwood Pub. Co., England. Outlines of Biochemistry: 5th Edition, Erice Conn & Paul Stumpf ; John Wiley and Sons, USA
Fundamentals of Biochemistry. 3rd Edition (2008), Donald Voet& Judith Voet , John Wiley and Sons, Inc. USA
Lehninger, Principles of Biochemistry. 5th Edition (2008), David Nelson & Michael Cox, W.H. Freeman and company, NY.
Biochemistry: 7th Edition, (2012), Jeremy Berg, LubertStryer, W.H.Freeman and company, NY
Biochemical Methods for Agricultural Sciences – Sadasivam and Manikam. Wiley Eastern Limited, 1992..
Practical Clinical Biochemistry Harold Varley, CBS; 6 edition (1 December 2006)
An Introduction to Practical Biochemistry (3rd Edition) – David T Plummer. Tata McGraw-Hill Publishing Company Limited, 1992

SEMESTER III
B.Voc. (Medical Lab Technology)

PAPER GENERAL BMLT 302 SAFE LABORATORY PRACTICES

Credits:6

Job Role:Medical Lab Technician

Objectives:

1. To develop understanding and precautions to ensure

Section IV

Best Practices in Lab

- Sensitization on current best practices in laboratory
- Elementary knowledge on Good Clinical Laboratory Practices (GCLP) of WHO
- Elementary Knowledge of laboratory safety guidance of OSHA (Occupational Safety and Health Administration), U.S. Department of Labor
- Elementary Knowledge of other current practices in laboratory used worldwide.

Reference Books

Kanai L. Mukherjee & Swarajit Ghosh (Eds) Medical Laboratory Technology, Vol. I: Procedure Manual for Routine Diagnostic Tests

Mukherjee, McGraw-Hill Education Med Lab. Technology, Volume 1

F. J. Baker, R. E. Silverton : Introduction to Medical Laboratory Technology

Tao Le and Vikas Bhushan First Aid for the USMLE Step 1 2017

Rajeev Sharma : First Aid Guide

American Red Cross (Author), Kathleen A. Handal - The American Red Cross First Aid and Safety handbook Paperback – Import, 27 May 1992

Dan Wolfe - Smashwords , 2014 : First Aid and Beyond

Ronald A. Bergman - Anatomy Atlases , 2004: Anatomy of First Aid: A Case Study Approach

www.osha.gov/Publications/complinks/OSHG-HazWaste/all-in-one.pdf

<http://www.ochs.org.uk/sites/default/files/health-and-safety.pdf>

http://www.hsa.ie/eng/Publications_and_Forms/Public

B.Voc. (Medical Lab Technology) SEMESTER III

PAPER Skill BMLT 303: Introduction to Parasitology and Medical Entomology

Credits:6

Job Role:Medical Lab Technician

Objectives:To Understand the role of parasites and vectors in disease transmission, and the most appropriate control strategies.

Instructions:

1. The syllabus of this paper has been divided into four units.
2. Examiner will set a total of nine questions comprising two questions from each unit, Question number one is compulsory of short answer type questions covering the whole Syllabus.
3. The students are required to attempt one question f

4. Concentration procedures for helminthic ova and cyst. Examination and identification of ova and cyst of parasites of medical importance.
5. Study of malarial parasite.
6. Laboratory diagnosis of kalaazar.
7. Detection of trypanosomes(the causal agent of sleeping sickness)
8. Laboratory diagnosis of microfilaria(Wuchereriabancroftii)
9. Quantitative determination of serum (or plasma) igG class antibodies to toxoplasma gondii by ELISA
10. Determination of IgM class antibodies to toxoplasma gondii by ELISA

Reference Books

1. Human Parasitology: By (author) Burton J. Bogitsh , By (author) Clint E. Carter , By (author) Thomas Oeltmann 4th Revised edition Publication City/Country San Diego, United States Publisher Elsevier Science Publishing Co Inc.
2. Clinical Parasitology : A Practical Approach 2nd edition Elizabeth A. Zeibig Publisher Elsevier - Health Sciences Division
3. Veterinary Parasitology M. A. Taylor , By (author) R. L. Coop , By (author) R. L. Wall John Wiley and Sons Ltd, 3rd revised edition
4. Medical Entomology: A Textbook on Public Health and Veterinary Problems Caused by Arthropods 2nd Edition by B.F. Eldridge (Editor), John Edman (Editor)
5. Medical and Veterinary Entomology, Second Edition 2nd Edition by Gary R. Mullen (Editor), Lance A. Durden (Editor)
6. Medical Entomology for Students 3rd Edition by Mike Service (Author)
7. Text book of Medical Lab Technology, Praful B. Godkar and Darshan P Godkar, Publisher Bhalani Publisher, Third edition Vol 1-3

Reference Books

1. Mims' Medical Microbiology Richard Goering , Hazel Dockrell , Mark Zuckerman , Ivan M. Roitt , Professor Peter L. Chiodini Publisher Elsevier Health Sciences
 2. Anantharyans and Paniker's Text book of Microbiology edited by CKJ paniker 7th edition, Publisher Orient Longman
 3. Roitt's Essential immunology Delves, Peter J., Martin, seamus J. Burton, Dennis R. Roitt, Ivan M Ananthanarayan and Paniker's Textbook of microbiology Kapil , artied
 4. Microbiology: an Introduction, 12th edition Gerard J. Tortora Berdell R. Funke and Christine L. Case
 5. Parasitology Chatterjee K.D.
 6. Microbiology Pelczar, Michal J and Others
 7. Medical microbiology Greenwood David and Other
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Job Role: Medical Lab Technician

Objectives:

1. To learn the techniques of collection of samples, their processing and the identifications of the various pathogens, like bacteria, parasites, viruses, using different techniques.
2. To provide vigorous training in the use of standard safety measures while handling highly infected material.
3. To provide basic knowledge of the different diseases caused by various microorganisms is also imparted.

Instructions:

1. The syllabus of this paper has been divided into four units.
2. Examiner will set a total of nine questions comprising two questions from each unit, Question number one is compulsory of short answer type questions covering the whole syllabus.
3. The students are required to attempt one question from each unit and the entire Compulsory Question No. 1.
4. All questions carry equal marks

Section I

IDENTIFICATION OF BACTERIA:

- Micrococci, Staphylococci, Streptococci, pneumococci, Corynebacteria, Escherichia, Klebsiella,
- E-coli, Enterobacter, Proteus- providencia Salmonella, Shingella, Arizona, Citrobacter, Yersinia,
- Pseudomonas, Vibrio, Haemophilus, Mycoplasma, Rickettsia, Chlamydia, Tricragents.
- Introduction to important diseases caused by Streptococcus, Pneumococcus, Neisseria, Corynebacterium, Bacillus, Clostridium tetani, Clostridium perfringens, enterobacteriaceae (Proteus, Shigella, Salmonella), Vibrio cholerae

Section IV

- Principles of biosafety hoods use of pipettes, syringes and other virus contaminated
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Job Role:Medical Lab Technician

Objectives:

1. Elementary knowledge of specimen collection
2. Elementary knowledge of tissue fixatives
3. Elementary knowledge of tissue processing :
4. Logging of specimen, preparation of tissues , processing of tissues , Frozen section technique , Handling and embedding of small tissue fragments.
 - Understand about section cutting
 - Understand about Staining
5. Staining Procedures
6. Autoanalyzer, Tissue Processor, Microtome

7. Elementary knowledge of Decalcification

Instructions:

1. The syllabus of this paper has been divided into four units.
2. Examiner will set a total of nine questions comprising two questions from each unit, Question number one is compulsory of short answer type questions covering the whole syllabus.
3. The students are required to attempt one question from each unit and the entire Compulsory Question No. 1.
4. All questions carry equal marks

SECTION I

- Introduction to histopathology and laboratory organization.
- Elementary knowledge of sample collection
- Reception, recording and labeling of histology specimens.

SECTION II

- Fixation and various tissue fixatives.
- Processing of histological tissues for paraffin-embedding.
- Embedding and embedding media.

SECTION III

- Microtome-various types, their working principle and maintenance.
- Microtome knives and knife sharpening.
- Practical section cutting, cutting faults and remedies.
- Routine staining procedures, mounting and mounting media.

SECTION IV

- Dye chemistry, theory and practice of staining.
- Solvents mordents, accelerators and accentutators.
- Uses of controls in various staining procedures.
- Metachromasia and metachromatic dyes.
- Haematoxylin stain. Its importance in histology.
- Carbohydrates and amyloid – special stains and procedures.
- Connective tissues trichrome staining and other special stains for muscle fibres, elastic, reticulin fibres and collagen fibres.
- Principles of metal impregnation techniques.
- Demonstration and identification of minerals and pigments
- Elementary knowledge of Decalcification

Practicals

1. Tissue processing by using tissue processor
2. Sharpening of the microtome knife
3. Gross examination and fixation of the specimen
4. Decalcification of calcified tissue

5. Processing of the tissue by manual method
6. Section cutting of paraffin wax embedded tissue
7. To fix the section on the slide
8. Staining of the tissue section by using hematoxylin and eosin staining method

Reference Books

1. Robbins Basic Pathology-Vinay Kumar , Abul K. Abbas , Jon C. Aster
2. Histopathology Guy Orchard , Edited by Brian Nation Publisher Oxford University Press
3. Text book of Histology, 2nd edition, palGP, Paras medical publisher.
4. Histology for Pathologists by Stacey E Mills MD
5. Sternberg's Diagnostic Surgical Pathology [2 - Volume Set] by Stacey E Mills MD
6. Anatomic Pathology Board Review, 2e by Jay H. Lefkowitz MD
7. Clinical Pathology Board Review, 1e 1 Har/Psc Edition
8. by Steven L. Spitalnik MD (Author), Suzanne Arinsburg DO (Author), Jeffrey Jhang MD (Author)
- 9.

Reference Books:

1. Practical Principles of Cytopathology Revised 1st E

Job Role: Medical Lab Technician

Objectives:

1. To learn the techniques of collection of samples, their processing and the identifications of the various pathogens, like bacteria, parasites, viruses, using different techniques.
2. To provide basic knowledge of the different diseases caused by various microorganisms is also imparted, their processing and the identifications of the various pathogens, like bacteria, parasites, viruses, using different techniques.
3. To provide training in the use of standard safety measures while handling highly infected material. To provide basic knowledge of the different diseases caused by various microorganisms is also imparted

Instructions:

1. The syllabus of this paper has been divided into four units.
2. Examiner will set a total of nine questions comprising two questions from each unit, Question number one is compulsory of short answer type questions covering the whole syllabus.
3. The students are required to attempt one question from each unit and the entire Compulsory Question No. 1.
4. All questions carry equal marks

Section I

- Physiology of bacteria, anatomy of bacterial cell, growth requirement of bacteria-growth curve, nutrients required. Gram positive & Gram negative Bacteria.
- Elementary knowledge of Pyogenic cocci, Gram Negative Bacilli, Gram Positive bacilli, anaerobes, mycobacteria and spirochetes.
- Difference between cocci & bacteria,
- Normal flora of human body.

Section II

- Lab diagnosis of common Bacterial infections viz:- pyogenic infections, Respiratory tract infections, Meningitis, Diphtheria,
- Whooping Cough, Gas gangrene, food poisoning, Enteric fever, Acute diarrhea diseases, cholera, Urinary tract infection,
- Tuberculosis, Leprosy, Plague, Anthrax, Typhus fever, syphilis, Gonorrhoea and other STD's.

Section III

- Disease oriented microbiology, culture & sensitivity test, aerobic, anaerobic techniques
- Introduction to Fungi and parasitic fungi, specimen collection, Laboratory diagnosis of mycotic infections, Diagnostic mycology
- Principles of Antigen-Antibody reactions.
- Principles and mode of action of antibiotics and chemotherapeutic agents for bacteria and fungi.

Section IV

- Diagnostic Microbiology & Micro Techniques
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11. Isolation of bacteria by streak plate techniques
12. To perform qualitative widal test

Reference Books

1. Mims' Medical Microbiology Richard Goering , Hazel Dockrell , Mark Zuckerman , Ivan M. Roitt , Professor Peter L. Chiodini Publisher Elsevier Health Sciences
2. Roitt's Essential immunology Delves, Peter J., Martin, Seamus J. Burton, Dennis R. Roitt, Ivan M. Ananthanarayan and Paniker's Textbook of microbiology Kapil , artied
3. Microbiology: an Introduction, 12th edition Gerard J. Tortora, Berdell R. Funke and Christine L. Case
4. Parasitology Chatterjee K. d.
5. Microbiology Pelczar, Michal J and Others
6. Medical microbiology Greenwood David and Other
7. Ananthanarayan and Panikar's text book of Microbiology Artikapil
8. Immunology Male David and Other
9. Mackie and McCartney practical Medical Microbiology Collee J.G and Other
10. Bailey and Scott's Diagnostic Microbiology, 13th edition Patricia Tille
11. Sherris Medical Microbiology , 6th edition Pottinger, L. Barth Reller and Charles R. Sterling

Job Role: Medical Lab Technician

Objective:

1. To gain elementary knowledge about Immunology
2. To understand the basics of Humoral Immunity, Cell Mediated Immunity and Antigen-Antibody Interactions

Instructions:

1. The syllabus of this paper has been divided into four units.
2. Examiner will set a total of nine questions comprising two questions from each unit, Question number one is compulsory of short answer type questions covering the whole syllabus.
3. The students are required to attempt one question from each unit and the entire Compulsory Question No. 1.
4. All questions carry equal marks

Section I

- Immunity/Immune system, innate immunity, adaptive immunity, cells and organs involved in immune system
- Introduction and history of Immunology, Non-specific Defense; Physical Barriers, Chemical Barriers, Phagocytosis, Inflammation, Fever, Types of Immunity, Active & Passive Immunity, Immunological memory, Primary & Secondary Lymphoid organs, Mucosa Associated Lymphoid tissue (MALT), Cutaneous Associated Lymphoid Tissue (CALT), Lymphocyte Traffic, Cells of immune system, Antigens; factors affecting Immunogenicity, epitopes, haptens.
- Infection and immune system, Cancer Immunology

Section II

- Humoral Immunity
- Humoral Immune Response, Antibodies / Immunoglobulins, Structure, function and type of antibodies, Antigenic-combining regions of antibodies, factors influencing antibody production, Genetic model, Multigene Organisation, generation of antibody diversity.

Section III

- Cell Mediated Immunity
- Cell Mediated Immune System, Mechanism of CMI, Types of effector T Cells, Helper T-cells, Suppressor, T-cells, cytotoxic T cells, Killer T cells, Cytokines, Lymphokines, Colony Stimulating factors, Tumour Necrosis factor, Interferons, Accessory cells (Macrophages), the Complement System, Classical and Alternate pathway, HLA, Monoclonal antibody technology and its applications, Interactions between B and T lymphocytes.

Section IV

- Antigen-Antibody Interactions
- Antigen-Antibody Interactions : Precipitation reaction, Immuno-diffusion test, counter current Immuno electrophoresis, complement fixation tests, Widal test, Wasserman's test, Weil Felix reaction, Western Blotting, Types of vaccines.

Practical

- Antigen-antibody interactions
- Agglutination
 - Precipitation
 - Blood grouping
 - Immunodiffusion

REFERENCE BOOKS

1. Immunology 5th ed Janis Kuby, W.H. Freeman & Co Ltd; 5th Revised edition.
2. Fundamental Immunology 5th edition (August 2003): by William E., Md. Paul (Editor) By Lippincott Williams & Wilkins Publishers
3. Essential Immunology, Ivan M. Roit (1994)– Blackwell Scientific Pub, Oxford.
4. Cellular and Molecular Immunology, 3rd ed, Abbas, Saunders; 7 edition (11 June 2011)
5. Practical immunology, Frank Hay, 4th Edition, Blackwell Science
6. Medical Microbiology, Anantnarayan 3. Introduction to Practical Biochemistry, D.T60306(d)12.9455()-66u e Lit

SEMESTER V
B.Voc. (Medical Lab Technology)

Skill BMLT 505 Paper - Clinical Biochemistry -I

Credits 6

Job Role: Medical Lab Technician

Objectives: Clinical enzymology. Elementary knowledge of Hormones Elementary knowledge of Minerals and Electrolytes To Understand about Therapeutic Drug Monitoring

Instructions:

1. The syllabus of this paper has been divided into fo

SEMESTER VI
B.Voc. (Medical Lab Technology)

PAPER Skill BMLT 602 : Sensitization to Blood Banking and Infection Control

Credits 6

11. Textbook of Blood Banking and Transfusion Medicine - Elsevier eBook on VitalSource, 2nd Edition By Sally V. Rudmann, PhD, MT(ASCP)SBB, CLS
12. Textbook of Blood Banking and Transfusion Medicine by Sally V. Rudmann
13. Hospital Epidemiology and Infection Control by C. Glen Mayhall
14. Hospital Acquired Infections: Prevention and Control Paperback – Import, 2010 by Purva Mathur
15. Hospital Infection Control Guidelines: Principles and Practice by Singh Sanjeev, Gupta Shakti Kumar, Kant Sunil
16. Bennett & Brachman's Hospital Infections Sixth Edition by William R. Jarvis MD (Author)
17. Handbook of Hospital Infection Control, 2013 by Sanjay Singhal
18. Hospital Infection Prevention Principles & Practices Editors: Wattal, Chand, Khardori, Nancy

- Updated on advanced techniques and future trends in field of tele-pathology

Practicals

1. Preservation of microbes and Lyophilisation methods.
2. Total and viable counts of bacteria.
3. Testing of disinfectants-Rideal-Walker, Chick-Martin and In-use tests.
4. Preparation and standardization of vaccines and immunization schedule
5. Lab, Diagnosis of common bacterial infection viz: Pyogenic infections, Respiratory tract infections, M

Detailed demonstrations of examinations of bone marrow,CSF, and other body fluids like pleural fluid, pericardial,peritoneal,synovial,ascitic fluid.

Reference Books

1. A guidebook to Biochemistry Michael Yudkin
2. A Manual of Laboratory & Diagnostic Tests (6/ e) Fr

