

SYLLBUS FOR I YEAR DMLT

**Code ML- 01 COMMUNICATION SKILL IN ENGLISH,
COMPUTER KNOWLEDGE AND ENVIRONMENT STUDY**

English

Contents

- Narration. Voice. Basic Sentence patterns. (Nine basic sentence patterns)
- Tenses. Common errors (Noun. Pronoun. Articles. Adverb, Punctuation, Preposition etc.)
- Modals in Conversational Usage. Prefix. Suffix. Idioms & phrasal verbs:
Modals
Can. Could should. Will. Would. May. Might. Must. Need not. Dare not. Ought to, used to,
- Phrases**
At all: In stead of: In spite of: As well as; set up: Up set; Look up; Call off; Call out; Come across; set right; Look other.
- Idioms**
Work up (excite): Break down: stand up for: Turn down: pass away: pass on: Back up; Back out; Carry out; done for (ruined); Bring about: Go through: Ran over: Look up (improve); pick out (selected).
- Letter Writing, paragraph writing. Report writing

COMPUTER KNOWLEDGE

1. Computer appreciation
Characteristics of computer- Input, out put, storage unit, CPU and Computer system.
2. Computer organization
 - a) Central processing unit- Control unit, arithmetic unit, instruction unit, register, processor speed
 - b) Memory- Main memory, storage evaluation criteria, memory, memory capacity, random access memories, read only memory, secondary storage devices (Magnetic disk, floppy, pen drive and hard disk), optical disks CD-ROM, mass storage devices.
3. Input devices- Keyboard, mouse, trackball, joystick, scanner, optical mark reader, bar code reader, magnetic ink character reader, digitizer, card reader, voice recognition, web camera, video camera.
4. Output devices- Monitors, printers(Dot matrix, inkjet printer & laser printer), plotters, computers output micro-film(COM), multimedia projector.
5. Operating system- Microsoft windows, an overview of different versions of windows, basic windows elements, file management through windows, using essential accessories: System tools, disk cleanup, disk deframenter, entertainment, games, paint, wordpad, recycle bin, windows explorer, creating, folders and icons.
6. Word processing—Word processing concepts, saving, closing, opening an existing document, selecting text, editing text, finding and replacing text, printing documents, creating and printing merged document, mail merge, charater and paragraph formatting,

page design and layout, editing and proofing tools(Checking and correcting & spelling), handling graphics, creating tables and charts, document templates and wizards.

Environment Study

1. General
 - a) Biotic and abiotic environment
 - b) Adverse effects of environment pollution
 - c) Control strategies
 - d) Various acts and regulation
2. Pollution-
 - a) Water pollution- water quality, standards for potable, surface and underground water sources, impurities in water and their removal, defluoridation, adverse effects of domestic waste water and industrial effluent to surface water sources, eutrophication of lakes, self purification of streams.
 - b) Air pollution- sources of air contaminants, adverse effects on human health, measurement of air quality standards and their permissible limits, measures to check air pollution, green house effect, global warming, acid rain, ozone depletion.
3. Biomedical waste management- introduction to biomedical waste, types of biomedical waste, collection of biomedical waste and treatment and safe disposal of biomedical waste.
4. Solid waste management- introduction to solid waste, its collection and disposal, recovery of resources, sanitary land filling, vermi composting and hazardous waste management.

Code ML-02

Anatomy and Physiology

Rationale

The study of basic anatomy and physiology is essential because it will help in understanding the basic structure of the human body and normal function in health. During diseases the normal functions may likely to be affected. By various laboratory tests, the student will be able to know the abnormal functioning of the body that ultimately helps in diagnosis of the disease.

Contents Anatomy and Physiology

1. Cells: Structure and functions
2. Tissues: Epithelial, Muscular, Connective,(Cartilage, Bone) and Nervous
3. Blood
4. Circulatory system
5. Digestive system
6. Respiratory system
7. Nervous system
8. Endocrine system
9. Urinary system

10. Ear, Nose, Tongue, and Skin
11. Skeleton system
12. Muscular system
13. Reproductive system

CODE ML-03 Haematology and Blood Banking

Rationale

Haematology and blood banking are very important branches of laboratory medicine. The student will be able to know the basic components of blood and their significance in blood, various types of diseases can be diagnosed.

Blood banking is part of haematology. It gives knowledge of different types of blood groups, cross matching and transfusion of blood at the time of emergency.

Contents

Clinical pathology and quality control

Clinical Pathology

1. Introduction of clinical pathology
2. Quality control- Internal and external
3. Urine analysis
4. Collection, composition, presentation and gross examination of urine
5. Chemical and microscopic examination of urine
6. Cerebrospinal fluid (CSF) examination
7. Examination of other body fluids
8. Semen analysis

Haematology

Introduction to clinical Haematology, instruments and glassware used in haematology.

Preparation of various stains, buffers and other solutions used in haematology.

Methods of collection of blood sample and anticoagulants used in different tests.

1. Red blood counting
2. White blood cell count and absolute eosinophil count
3. Platelets and reticulocyte count
4. Methods of haemoglobin estimation, their merits and demerits
5. Packed cell volume
6. Blood indices
7. Erythrocyte sedimentation rate
8. Preparation and staining of peripheral blood smear
9. Morphology of normal and abnormal forms of RBCs
10. Morphology of normal and abnormal forms of leucocytes
11. Differential leucocyte count
12. Bone marrow examination – Different sites and needles used
13. Osmotic fragility test
14. Estimation of foetal haemoglobin
15. G6PD estimation
16. Sickling test

Blood Banking

1. Screening and selection of donor
2. Collection and storage of blood
3. Blood grouping- ABO, RH, and other systems of blood groups, subgroups of A, Bombay group, Antibodies to ABO system , Anti AB and Anti H antibody
4. ABO testing slides and tubes test, reserve grouping, discrepancies, between cell and serum results, source of error, rouleux formation and methods of checking it
5. RH grouping test slide or rapid tube test false-positive and false-negative results, Du system and its significance
6. Cross matching, reasons of cross match, saline, albumin, coombs and enzymes in testing
7. Coombs test- Direct and indirect, principle, explanation of procedure and sources of error, control, interpretation and clinical application.
8. Preparation of various components of the blood.

CODE ML-04.

CLINICAL PATHOLOGY

RATIONALE

It helps in monitoring the normal functioning of different systems of human body. Abnormal clinico-pathological results give a clue regarding a disease process going on inside the body.

CONTENTS

1. Complete urine examination .
2. Semen analysis
3. CSF and other body fluids examinations.
4. Blood cell counts including reticulocyte count.
5. Haemoglobin estimation. Haemoglobin electrophoresis
6. Determination of P.C.V.ESR and blood indices
7. L.E. cell test .test for cold agglutination.
8. Preparation and staining of peripheral blood and bone marrow smears.
9. Differential leukocyte count.
10. Osmotic fragility test.
11. Sickling test.
12. Foetal haemoglobin estimation
13. G6 PD estimation
14. Blood grouping and cross matching
15. Coombs test-direct and indirect.
16. Organization of blood bank. Separation uses of various components of blood.
17. Transfusion Reactions.

CODE ML-05

CLINICAL PRACTICAL TRAINING-1

RATIONALE

It is very important for a medical laboratory trainee to have practical knowledge of various laboratory tests. The student will be able to interpret correctly the test results and correct diagnosis of a disease.

PRACTICALS

Practical related to theory papers i.e. Basic & physiology. Haematology & Blood Banking and Clinical pathology.

Note: The Essential Theory should be taught during the Practicals.

CODE ML-06

M.L.T. INSTRUMENTS PRACTICE LAB-1

RATIONALE

This is a practice- oriented laboratory in which the student will be give hands-on experience of the equipments used in the laboratory. After undergoing the practicals the student will be able to handle the equipments properly and he' she will be able to repair & maintain the equipments used in the laboratory.

PRACTICALS

1. introduction to equipments
2. Simple usage
3. Indication and Contraindications use
4. Repair and Maintenance of equipments used in laboratory.

SYLLBUS FOR II YEAR DMLT

**CODE-11 LABORATORY MANAGEMEN, PERSONAL SAFETY and
STERILIZATION**

CODE – 12 MICRO BIOLOGY INCLUDING PARASITOLOGY & IMMUNOLOGY

RATIONALE

A large number of diseases are caused by infectious organisms.

The microbiology & parasitology give knowledge of various infectious agents & their role in different infectious diseases. Immunology deals with immune system and its role in different infectious diseases. Immunology deals with immune system and its role in normal health and various diseases.

Contents

Human Parasitology

Protozoa- Classification, morphology, life cycle and lab diagnosis of *E. histolytica*, *Giardia intestinalis*, Malarial parasite, *Trichomonas*, *Trypanosoma*, *Toxoplasma*.

Nematodes

Classification, morphology, life cycle and lab diagnosis of *Ascaris lumbricoides*, *Ankylostoma duodenale*, *Enterobius vermicularis*, *Trichuris trichuria*, *Strongyloides*, *Dracunculus medinensis*, *Wuchereria bancrofti*.

Plathelminths

Classification- names with general outline. Morphology, life cycle and lab diagnosis of *Taenia solium*, *Taenia saginata*, *Echinococcus granulosus*.

Systemic Bacteriology

Morphology, culture, identification and laboratory diagnosis

1. Gram positive cocci- *Staphylococci*, *Streptococci*, *Pneumococci*
2. Gram negative cocci- *Neisseria*
3. Gram negative bacilli- *E. coli*, *Klebsiella*, *Enterobacter*, *Proteus*, *Salmonella*, *Shigella*, *Vibrio*, *Pseudomonas*
4. Gram positive bacilli- *Corynebacterium*, *Clostridium*, *Bacillus*
5. Spirochaetes- Morphology and serological (*Treponema pallidum*) diagnosis
6. Mycobacteria- Morphology, classification, identification by biochemical tests

Virology

General characteristics with classification

- Human Immunodeficiency virus
- Hepatitis viruses

Immunology

1. Antigen-Antibody reactions- Principles and practical application of various type of serological tests- precipitation, agglutination, complement fixation test, neutralization test, ELISA, Radioimmunoassay, electrophoresis, immunofluorescence and Polymerase chain reaction. (In short)
2. Hypersensitivity- definition and type only

ML-13 Pathology

Rationale

Contents

Histopathology

- General properties of Histo-pathological work: collection of specimen, numbering and giving tissue bits.
- Equipments used in Histopathology, their merits and demerits and care to be taken.
- Fixative used in Histopathology- preparation, advantage and disadvantages.
- Frozen section and cryostat technique- Staining and mounting morbid anatomy.
- Decalcification- methods, advantages and disadvantages of each.

Cytopathology

- Introduction of cytopathology, methods of collection of materials making smears and preparation of fixative used.
- Different stain used, their preparation and staining the smears.
- Demonstration of Barr-bodies (Sex chromatin).

Histopathology Technique

- Tissue processing- fixation, dehydration, clearing, impregnation in paraffin
- Making of blocks and section cutting, errors in section cutting and their correction.
- Preparation of different types of haematoxylin and eosins including staining technique for rapid diagnosis.
- HAematoxylin and eosin staining , including staining technique for rapid diagnosis and mounting.
- Preparation of different type special stain.
- Special staining technique.
- Histochemical and cytochemical technique.
- Immuno-histochemical and immuno-cytochemical staining.

Haematology

- Investigation of bleeding, disorders- normal coagulation cascade.
- Bleeding time and clotting time , methods and interpretation.
- Clot retraction time.
- Activated partial thromboplastine time
- Prothrombin time.
- Thrombin time.
- Fibrinogen degradation (FDP).

Museum technique

- Preparation of specimen for mounting.

- Preparation of fixatives for mounting.
- Technique mounting.
- Organization of medical laboratory and museum and their maintenance.

ML-14 Biochemistry

Rationale

Biochemistry imparts, knowledge of basic chemical components i.e. carbohydrate, proteins, lipids, vitamins, minerals etc. which are very important for various biochemical reactions going on in human body. Disturbance in various normal biochemical reactions may result during disease process. Therefore, their study helps in diagnosis of diseases.

Contents

1. Digestion absorption and assimilation of carbohydrate, blood sugar, regulation of blood sugar, glycolysis, TCA cycle, Glyconeogenesis, glycogenolysis, GTT, metabolic diseases associated with carbohydrate metabolism, diabetes mellitus, glycated haemoglobin.
2. Digestion, absorption of proteins, amino acids, urea formation, formation of creatinine. Metabolic disorders associated with amino acid metabolism, eletrophoretic separation of proteins.
3. Digestion and absorption and assimilation of lipids. Ketone bodies formation. Metabolic disorders associated with lipids, cholesterol and lipoproteins metabolism.
4. Metabolic disorders associated with nucleic acid metabolism, gout etc.
5. Kidney function tests. Urine formation, normal and abnormal constitutes.
6. Liver functions tests and different type of Jaundice.
7. Cardiac profile tests application and significance.
8. Pancreatic enzymes and diagnostic importance.
9. Chemistry of blood. Composition and importance of different constitutes haemoglobin, haeme biosynthesis and porphyries.
10. csf and its composition and diagnostic importance.
11. Constitutes of gastric juice and diagnostic importance.
12. Principles of special investigations like RIA, ELISA, and Chemiluminescence.
13. Normal values. Normal range. Interpretative clinical chemistry, quality control- internal and external.
14. Automation in clinical investigation – auto and semi auto analysers, cobtinuous flow analyzers, discrete analyzers, batch analyzers, random access auto analyzers, dry chemistry analyzers- reagents kits.
15. Recording of patients date, reporting avlues, preparation of investigations and statistics.

ML-15 Clinical Practical Training II

Rationale

Practical training is very essential because it gives detailed practical knowledge regarding various tests so that trainees will be able to judge the importance of the tests in diagnosis of various diseases.

Practicals

Practical training related to that is Microbiology, including parasitology and immunology. Pathology and biochemistry.

In II year trainee should be made to associate with senior technicians in conducting all the investigations of the laboratory. Trainee should be exposed to all sections of the laboratory. Candidate must estimate following analytes himself glucose, urea, creatinine, uric acid, calcium, phosphorus, iron, TIBC, total protein, albumin, bilirubin (direct/indirect), triglycerides, cholesterol, LDL cholesterol, HDL cholesterol, SGOT, SGPT, alkaline phosphatase, acid phosphatase, LDH, CPK, CK-MB, GGT, Electrolytes by flame photometry and ISE. Blood gas analysis, estimation of hormones by ELISA (Insulin, T3, T4, TSH), estimation of GHb

Biochemical examination of pathological urine.

Biochemical examination of body fluids- CSF, Pleural Ascitic fluids.

Candidate should be given practical training in clinical biochemistry lab.

1. Hanging drop preparation
2. Biochemical reaction- Inoculation and interpretation
3. Antibiotic sensitivity tests
4. Collection of blood for culture sensitivity
5. Collection of skin scraping for fungus
 - KOH and lactophenol preparation
 - Inoculation of Sabouraud's
 - Rapid serum test
 - Sugar fermentation and assimilation
 - Slide culture
 - Stool preparation- saline and iodine to study morphology of Ova and cyst
6. Serological tests- Widal, VDRL, Latex agglutination, ELISA
7. Urine examination complete
8. Safe disposal of hospital waste and management
9. Handling of experimental animals
10. Collection of blood from sheep, guinea pig, rabbit
11. Quality control measures
 - Tissue processing, block making, section cutting and routine H & E staining
 - Different types of special staining in histopathology
 - Preparations of stains for sections and smears
 - Preparation fixatives
 - Paraffin embedding of tissues

- Preparation of paraffin blocks
- Honing of microtome razors
- Microtomy- preparation of sections
- Frozen section technique- demonstration
- Preparation and fixation of smears for cytology
- Haematoxylin and eosin staining
- Papinicolou's staining
- Some of the special stains
- Record keeping
- Mounting of museum specimen

Haematology

- Bleeding and clotting time
- Interpretation of clot retraction
- Prothrombin time, APTT and TT
- Fibrinogen degradation product(FDP)
- Substitution tests for factor identification

ML-16 MLT INSTRUMENTS PRACTICE LAB-II

Rationale

Since the trainee has to work on various laboratory instruments and equipments. He must have basic knowledge and practical training about the different machines so that in case of any trouble during work he/she will be able to correct and repair the faults.

Practicals

- Introduction to equipments
- Simple usage
- Indication and contraindication use
- Repair and maintenance of instruments