

# NIMS UNIVERSITY, JAIPUR



## SYLLABUS

**DIPLOMA IN MEDICAL LABORATORY  
TECHNOLOGY (D.M.L.T.)  
(2 Years Course for 10+2 Stream)**

# DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY (D.M.L.T.)

## TEACHING & EXAMINATION SCHEME

### FIRST YEAR

Subjects	Total Marks	
	TH	PR
Anatomy & Physiology	100	50
Hematology & Blood Banking	100	-
MLT Instruments	100	50
<b>Total</b>	<b>300</b>	<b>100</b>

## TEACHING SCHEME

### FIRST YEAR

## Paper-I: Anatomy & Physiology

### **Anatomy and Physiology of the Human Body**

1. Cells: Structure & Function.
2. Tissue: Epithelial, muscular, connective (Cartilage & Bone) & 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 & Skin
11. Skeletal system
12. Muscular system
13. Reproductive system

### **Reference Books**

1. Medical Laboratory manual for Tropical countries Volume I & II (Monica Chesbrough ELBS edition)
2. Practical Microbiology (Prof. C.P. Babeja)

## Paper-II: Hematology & Blood Banking

### HEMATOLOGY

- Introduction to Clinical Hematology.
- Instruments and glasswares used in hematology
- Preparation of various stains, buffers and other solutions used in hematology.
- Methods of collection of blood sample
- Anticoagulants used in different tests.
- Blood composition, function and homeostasis.
- Blood specimen collation and Anticoagulants.
- Anticoagulant for blood preservation, ACD, CPD CPDA-I, Heparin Advantages and Disadvantages. Shelf life of Blood. Changes taking place in Blood on storage, Nat, Let etc.
- Routine Hematological Tests.
- Red blood cell counting
- White blood cell count and absolute eosinophil count
- Platelet and reticulocyte count
- Methods of haemoglobin estimation, their merits and demerits
- Packed cell volume method, principle and normal value
- Morphology of RBC, Total RBC count and normal value.
- Morphology of normal and abnormal forms of RBC's
- Morphology of normal and abnormal ICU kocytes
- Total WBC Count and Normal Value.
- Differential Leukocyte count.
- Blood Indices
- Erythrocyte sedimentation rate. (ESR) method, principle, normal value.
- Preparation and staining of peripheral blood smear.
- Morphology of platelet, platelet count and Normal value.
- Calculation of RBC Indices; MCV, MCH, MCHC.
- Anemia, RBC, Morphology, Normal & abnormal Hypo Chromia.
- Special Hematological Test
- Screening for sickle cell Anemia
- Estimation of foetal hemoglobin
- Test of L.E. cells
- Under standing fine blood relocated diseases.
- Leukemia
- Hemophilia
- Thallasemia
- Sickle Cell Anemia
- Blood Poisoning
- Origin, formation and fate of blood cell Theories of blood cell formation.
- Bone marrow sites and needles used
- Osmotic fragility Test

## BLOOD BANKING

- Introduction, Blood group system
- Blood Grouping – ABO, RH, and other systems of blood groups, sub-group of A, Bombay group; Antibodies to ABO system. Anti AB and H Antibody.
- Cross matching test in emergency
- Blood bank preparation
- Blood collation procedure, transport and storage
- Preparation and use of whole blood.
- Rouleus formation and method of checking Inis
- Coomb's Test Direct and Indirect principle explanation of and sources of error.
- Demonstration of Coomb's Test- Direct and Indirect
- Labeling of tubes, methodology; legal implications in compatible course match.
- Auto unit bodies pleasure expanders, multiple mycelium etc. Affecting X-match.
- Difficult in X-match and members of investigations
- Quality control in Blood Banks
- Specimen collection
- Risk assessment for AIDS and Serum hepatitis.

## **Paper-III: MLT Instruments**

### **RATIONALE**

This is a practice-oriented laboratory in which the student will be given 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 equipment used in the laboratory.

### **CONTENTS**

1. Introduction to equipments
2. Simple usage
3. Indication & contraindications use
4. Repair & maintenance of equipments used in laboratory.

### **REFERENCE BOOKS**

1. Medical Laboratory Manual for Tropical Countries, Vol. I & II, Monica Chesbrough, ELBS Edition.
2. Medical Laboratory Technology – A Procedure Manual for Routine Diagnosis Tests, Vol. I, II & III, Kanai L. Mukherjee, Tata McGrass Hill Pub., New Delhi.

**SECOND YEAR**

Subjects	Total Marks	
	TH	PR
Safe Injection Procedure	100	-
Clinical Pathology	100	-
Computer Applications	100	-
Clinical Practical Training-I		100
<b>Total</b>	<b>600</b>	<b>200</b>

**Paper-I: Safe Injection Procedure**1. Session – 1

Handling and Disposal of injection related waste

- i) Autoclave
- ii) Biomedical waste
- iii) Incineration
- iv) Needle Stick injury
- v) Recycle
- vi) Reuse
- vii) Terminal Disposal of waste

2. **Handling Injection Waste**

a) Steps for handling injection waste after giving injection

- i) Disposal of injection. Related wastes at the Health facility
- ii) Steps of disposal injection related waste

b) Handling of waste containers

- Colour – coding and Types of container for disposal at Bio Medical wastes
- 1) The centre pollution Control Board and the Ministry of Health and Family Welfare on handle of injection related waste at the outreach level/outside District Hospital or CHCs and PHC etc.
- 2) The disposal of Bio-Medical waste (BMW) generated within tertiary care hospital/district hospitals/CHCs/PHCS etc.
- 3) The containers containing and Syringes Needles and broken vials to the Common Bio-medical waste Treatment facilities

3. Session -2

- Setting up at a model injection centre
- Setting up a model injection centre at your health faculty
- (1) Basic elements of a model injection centre
  - a) Well equipped
  - b) Safe
  - c) Efficient

- d) Convenient
- e) Hygienic
- 2) Spacing in the injection room
- 3) Layout at the model injection centre
- 4) Adequate supply of injection equipments
- 5) List of essential equipment for an MIC
- 6) Injection tray
- 7) Waste disposal mechanism
- 8) Emergency Kit
- 9) Contents of emergency kit
- 10) Contents of emergency kit
- 11) First Aid Box
- 12) Check the oxygen cylinder daily for proper functioning.

4. Session -3

Rational use of injections

- 1) Irrational use of injections
- 2) Need for rational use of injections
- 3) What is irrational use of injections
- 4) Common examples of irrational use of injections
- 5) Are injections were effective and faster acting than oral medication.
- 6) If oral medication is as effective as injections then why are inject able medication prescribed.
- 7) Problems in the use of injections.
  - i) When to inject
  - ii) When not to inject

5. Session – 4

Technique of Safe Injection

- 1) What is a safe injection (WHO)
- 2) What is a Safe Injection Technique (IPEN)
- 3) Steps involved in giving Safe Injection
  - a) Preparing to give injection
    1. Assemble the necessary equipment
      - Syringe and needle
      - Spirit/alcohol swabs
      - Medicine/Vaccine Vial/Ampoule
      - Diluent
      - Hub Cutter
      - Bin to Dispose the syringte
    2. Wash handle
    3. Wear gloves
  - b) Drawing up medication
    1. Cutting open a glass Ampoule
    2. Drawing medication Vaccine with AD Syringe
    3. Drawing medication from a vial with regular plastic syringe
  - c) Common routes for giving injection and locating. The injection sites.
    - Injection routes



- i) Sites for intramuscular injections
- ii) Sites for interadermal and sub cutaneous injections
- d) Preparing the Skin
- e) Giving the injection
  - (i) Intramuscular injection
  - (ii) Subcutaneous injection
  - (iii) Intramuscular injection
  - (iv) Vene-puncture for giving injection

## Paper-II: Computer Applications

### 1. Computer Application

Characteristic of Computers.

- 1.1 Input, output, storage units
- 1.2 CPU, Computer System

### 2. Computer Organization.

- 2.1 Central Processing Unit
  - 2.1.1 Control Unit
  - 2.1.2 Arithmetic Unit
  - 2.1.3 Instruction Set
  - 2.1.4 Register
  - 2.1.5 Processor Speed
- 2.2 **Memory**
  - 2.2.1 Main Memory
  - 2.2.2 Storage Evaluation Criteria
  - 2.2.3 Memory Organization
  - 2.2.4 Memory Capacity
  - 2.2.5 Random Access Memories
  - 2.2.6 Read Only Memory
  - 2.2.7 Secondary Storage Devices
    - 2.2.7.1 Magnetic Disk
    - 2.2.7.2 Floppy and Hard Disk
    - 2.2.7.3 Optical Disks CD-ROM
    - 2.2.7.4 Mass Storages Devices
- 2.3 Input Devices
  - 2.3.1 Keyboard
  - 2.3.2 Mouse
  - 2.3.3 Trackball
  - 2.3.4 Joystick
  - 2.3.5 Scanner
  - 2.3.6 Optical Mark Reader
  - 2.3.7 Bar-code reader
  - 2.3.8 Magnetic Ink Character Reader
  - 2.3.9 Digitizer
  - 2.3.10 Card Reader

- 2.3.11 Voice Recognition
- 2.3.12 Web Cam
- 2.3.13 Video Cameras
- 2.4 Output Devices
  - 2.4.1 Monitors
  - 2.4.2 Printers
    - 2.4.2.1 Dot Matrix Printers
    - 2.4.2.2 Inkjet Printers
    - 2.4.2.3 Laser Printers
  - 2.4.3 Plotters
  - 2.4.4 Computers Output Micro-File (COM)
  - 2.4.5 Multimedia Projector
- 3. **Operating System**
  - 3.1 Microsoft Windows
    - 3.2.1 An overview of different version of Windows
    - 3.2.2 Basic Windows elements
    - 3.2.3. File Management through windows
    - 3.2.4. Using defragmenter, Entertainment, Games, Calculator  
Imaging-Fax, Notepad, Paint, WordPad. Recycle Bin, Windows, Explorer,  
Creating Folders, Icons
- 4. **Word Processing**
  - 4.1 Word Processing concepts
  - 4.2 Saving, Closing, Opening an existing document
  - 4.3 Selecting text, Editing text
  - 4.4 Finding and replacing text
  - 4.5 Printing documents
  - 4.6 Creating and printing merged documents, Mail merge
  - 4.7 Character and Paragraph Formatting, Page Design and Layout.
  - 4.8 Editing and Proofing Tools; Checking and correcting spellings.
  - 4.9 Handling Graphics
  - 4.10 Creating Tables and Charts
  - 4.11 Document Templates and Wizards
- 5. **Presentation Package**
  - 5.1 Creating opening and saving presentations
  - 5.2 Creating the look of your presentation
  - 5.3 Working in different views, working with slides
  - 5.4 Adding and formatting Text, Formatting Paragraphs
  - 5.5 Checking Spelling and Correcting Typing Mistakes
  - 5.6 Making notes, Pages and Handouts
  - 5.7 Drawing and working with objects
  - 5.8 Adding clip art and other pictures
  - 5.9 Designing slides shows
  - 5.10 Running and controlling a slide show
  - 5.11 Printing Presentations

**Reference Books**

1. P.K. Sinha and P. Sinha, "Foundations of Computing", First edition, First Edition 2002.
2. S. Sagman, Microsoft office 2000 for Windows", second Indian Print, 2001, Pearson education.

## Paper-V: Clinical Pathology

1. Urine Analysis: Composition of Normal urine; Collection of urine specimen; Routine urine Analysis – Physical, Chemical and microscopic examination.
2. Principle to Test for glucose in urine various methods.
3. Watson's Semi quantitative Test and Tests for urobilinogen, Demonstration of Techniques.
4. Test for melanin, Indian pleu, Homogentisic Acid Demonstration of Techniques.
5. Stool analysis; composition of normal stool, collection of stool specimens
6. Routine stool analysis physical chemical microscopic examination
7. Cerebrospinal fluid analysis (CSF): Composition of normal CSF; collection and processing of specimens
8. Routine CSF analysis, Physical, Chemical microscopic examination
9. Semen Analysis; Collection of Semen; Routine Semen Analysis
10. Sputum analysis; method presentation in collection of sputum; method presentation in collection of sputum.
11. Physical, Chemical and micro biological examination
12. Concentration method for AFB

## **Paper-VI: Clinical Practical Training**

### **RATIONALE**

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

### **CONTENTS**

Practicals related to theory papers i.e. Basic Anatomy & Physiology, Haematology & Blood Banking and Clinical Pathology.

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2. Medical Laboratory Technology – A Procedure Manual for Routine Diagnosis Tests, Vol. I, II & III, Kanai L. Mukherjee, Tata McGrass Hill Pub., New Delhi.