NIMS UNIVERSITY, JAIPUR

SYLLABUS

DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY (D.M.L.T.)
(3 Years Course for 10th Stream)

DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY

TEACHING & EXAMINATION SCHEME

FIRST YEAR

Subjects	Total Marks	
	TH	PR
Anatomy & Physiology	100	50
Hematology & Blood Banking	100	-
MLT Instruments	100	50
Safe Injection Procedure	100	-
Clinical Pathology	100	-
Computer Applications	100	-
Clinical Practical Training-I		100
Total	**600**	**200**

Paper-I: Anatomy & Physiology

Anatomy and Physiology of the Human Body

1. Cells: Structure & Function.
2. Tissue: Epithelial, muscular, connective (Cartilge & Bone) & nervous
3. Blood
4. Circulatory System
5. Digestive System
6. Respiratory System
7. Urine System

Reference Books

1. Medical Laboratory manual for Tropical countries Volume I & II (Monica Chesbrough E: BS 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.
- Anticogulante 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.

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

Paper-III: MLT Instruments Practice Lab-I

1. Basic Laboratory Principles and Procedures

Various types of laboratories

Standardized

Decontamination

Disinfection

The responsibilities of the Laboratory works

Responsibilities of a students.

2. Glassware

General glassware

Different types of Glass pipette

Different types of Glass Flask and funnel

Care and maintain a Glassware Plastic ware

Automatic dispenses and dilutes

Glass capillary

3. Solution and Reagents

Normal Salina (IL)

N/10 Hcl

Legal Iodine

Preparation of In Hcl

Preparation of 2/3 N Sulfuric Acid

Instrument

Balances

Distilled water Units (apparatus)

Centrifuge

Hot air oven

Water Bath 37ºc

Microscope

Training the Technician

Basic Steps for drawing a blood specimen

Deciding specimen types of anticoagulants

Vacationers

Specimen Stability

Physiological faders affecting the composition of body fluids

Collection of Win specimen

Paper-IV: 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.

Paper-V: Clinical Pathology

1. Urine Analysis: Composition of Normalurine; 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 propnobilinogen, 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

Paper-VI: 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

Paper-VII: 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

Practical related to theory papers i.e. Basic & Physiology, Hematology & Blood Banking and Clinical Pathology.

Reference Books

1. Medical Laboratory manual for tropical countries volume I & II, Monic Chesbrough ELBS editiion
2. Medical Laboratory Technology. A procedure manual for routine. Diagnosis Test Volume-I, II & III, K.L. Mukherjee

TEACHING & EXAMINATION SCHEME

SECOND YEAR

Subjects	Distribution of Time Hours per week				Distribution of Max. Marks / Duration							Total Marks
					University Exam.				Sessional			
	L	T	P	Total	TH	Hrs	PR	Hrs	CT	TU	PR(S)	
Anatomy & Physiology-II	3	-	-	3	100	3	-	-	-	-	-	100
Haematology & Blood Banking-II	5	-	3	8	100	3	-	-	-	-	-	100
MLT Instruments Practice Lab-II	-	-	3	3	-	-	50	3	-	-	100	150
Safe Injection Procedure-II	1	-	2	3	100	3	-	-	-	-	100	200
Clinical Pathology-II	5	-	3	8	100	3	-	-	-	-	-	100
Computer Applications-II	1	-	2	3	100	3	-	-	-	-	100	200
Clinical Practical Training-II	-	-	8	8	-	-	400	3	-	-	200	600
Hospital & Industrial Training (4 weeks) in Summer Vacation					-		100					100
Total	**15**	**-**	**21**	**36**	**500**		**550**				**500**	**1550**

L : Lecture

T : Tutorial

P : Practical

TH : Marks for University's Examination for Theory

PR : Marks for University's Examination for Practical

CT : Marks for Class Tests

TU : Marks for Tutorials

PR(S) : Marks for Practical and Viva-voce

Paper-I: Anatomy & Physiology-II

1. **An Introduction of the Human Body**

   Basic Life Processes Homeostasis; Body Flied; Control of Homeostasis

   Basic Anatomical Terminology

   Body positions, Regional Names, Planes and Sections: Body Cavities; Medical Imaging
2. **The Skeletal System**
3. **Joints**
4. **Muscles System**
5. **Nervous System**
6. **Inductive System**
7. **The Cardiovascular System**
8. **Lymphatic System**
9. **Digestive System**
10. **Reproductive System**

3.

Paper-II: Hematology & Blood Banking-II

HEMATOLOGY

- Special Hematological Test
- Screening for siclele cell Anemia
- Estimation of foctal hemoglobin
- Test of L.E. cells
- Under standing fine blood relocated diseases.
- Leukemia
- Hemophilia
- Thallassimia
- Sickle Cell Anemia
- Blood Poisoning
- Origin, formation and fate of blood cell Theories of blood cell formation.
- Bone morrow sites and needles used
- Osmotic fragility Test

BLOOD BANKING

- Blood collation procedure, transport and storage
- Preparation and use of whole blood.
- Rouleus formation and method of checking Inis
- Combs Test Direct and Indirect principle explanation of and sources of error.
- Demonstration of combos Test- Direct and Indirect
- Labeling of tubes, melnodalogy; legal implication,s in compatible course match.
- Auto unit bodies pleasure expanders, multiple mycelium etc. Affecting ax – 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 Practice LAB-II

RATIONALE

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

CONTENTS

1. Introduction to equipments.
2. Simple usage
3. Indication and contraindication
4. Repair and maintenance of instruments
5. Semi auto and fully automatic analyzer
6. Fully automatic cells counts
7. Flam Photometer
8. Colorimeter
9. Centrifuge, Different types.
10. Microscope, monocular, Bin ocular, Dark field immersion. Microscope.
11. Microtome (Different Types)
12. Balance (Different Types.)
13. Autoclave
14. Hot Air Oven, Serological oven
15. Water Bath (Different –Types)
16. Millipore filler and use
17. Ph meter
18. Automatic Tissue processor
19. Automatic Cover shipper

REFERENCE BOOKS

1. Medical Laboratory Manual for Tropical Countries Vol. I and II
2. Medical Laboratory Technology: A Procedure manual for Routine Diagnostic Tests. Vol. I, II & III
3. Manual of Basic Techniques for health laboratory.

Paper-IV: Safe Injection Procedure-II

1. Session 1

Handling and Disposal of Injection Related Waste

i) Autoclave
ii) Biomedical waste
iii) Incineration
iv) Needle Stick Injury
v) Recycle
vi) Re-use
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
Terminal disposal of injection related waste.
- Colour-coding and types of container for Disposal at Bio-medical wastes.

1) The centre pollution control board and the ministry of health & family welfare on handle of injection related waste at the outreach level/outside District Hospital or CHes and PHC etc.
2) The Disposal of Bio-Medical waste (BMW) generated within tertiary cure hospital/district hospitals/Ches/PHCS etc.
3) The containers containing and syringes needies and broken vials to the common Bio-medical waste treatment facilities.

3. Session – 2

- Setting up at a model injection center.
- Setting up a model injection center 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 mechanism
(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 they why are injectable medications 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)

Paper-V: Clinic Pathology-II

1. Cerebrospinal fluid Analysis (CSF); Composition of Normal CSF; Collection and processing of specimens
2. Routine CSF Analysis Physical, Chemical micro scopic examination
3. Semen Analysis; Collection of Semen; Routine Semen Analysis
4. Sputum Analysis: method presentation in collection of sputum; method presentation in collection of sputum.
5. Physical, Chemicals and micro biological examination.
6. Concentration method of AFB

Paper-VI: Computer Applications-II

Rational

The course has been designed to provide an introduction to Computer Technology and its tools. The student will be able to understand the basics of Computer and its application. The student will be able to appreciate the role of Computer Technology, more specifically computer hardware, software and is application. The course has focus on the following.

The course has focus on the following:

- Computer organization
- Computer operating system and software
- MS Windows, Word Processing
- Presentation Packages

Contents

1. **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 essential accessories: system tools-Disk cleanup. Disk defragmenter, Entertainment, Games, Calculator Imaging-Fax, Notepad, Paint, WordPad, Cycle Bin, Windows, Explorer, Creating Folders, Icons
2. **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 Paragarph 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
3. **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, Formating 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, "Foundation of Computing", first edition, first edition, 2002.
2. S. Sagman, Microsoft Office 2000 for Windows, second Indian Print, 2001, Pearson education.

Paper-VII: 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.

CONTENTS

Practical training related to microbiology, parasitology, immunology, pathology and biochemistry.

In 2nd 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 the following glucose, urea, creatinin, uric acids, calcium, phosphorus, iron, TIBC, Proteins, albumin, bilirubin, triglycerides, cholesterol, ABC, LDH, CPK, CK-MB, GGT, Hormone estimation by ELISA Biochemical examination of pathological urine.

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

Candidate must 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
6. Serological tests – WIDAL, VDRL, ELISA
7. Urine Examination complete
8. Safe disposal of Hospital waste and management
9. Handling of experimental animals
10. Collection of blood form sheep, guinea pig, rabbit
11. Quality control measures.

Reference Books

1. Medical Laboratory Manual for Tropical Countries Vol. I, and II.
2. Practical Microbiology Prof. C.P. Baveja

Clinical Practical-II

1) Urine analysis – physical, chemical, microscopic microbiological examination.
2) Stool analysis – physical, chemical, microscopic, microbiological examination
3) Semen analysis – Physical and chemical
4) Estimation of protein in urine.
5) Examination of Cerebrospinal Fluid (CSF)
6) Estimation of occult Blood in urine
7) Estimation of urobilinogen & Bile pigment in urine
8) Estimation of Bile Salts in urine
9) Estimation Acetones in Urine

10) Blood sugar estimation
11) Blood glucose estimation
12) Glucose Tolerance Test
13) Serum Total Protein
14) Albumin
15) Serum Cholesterol
16) Serum Creatinine
17) Serun bilirubin
18) Serum Acid Phosphates
19) Serum Alkaline Phosphate
20) SGOT & SGPT

Clinical Practical Work

(i) Method of Blood Collection
(ii) Hemoglobin estimation – Sahli's method, cyanmainemaglobin method.
(iii) Enumeration of RBC, WBC (TLC) and Platelets
(iv) Differential Count (DLC)
(v) Packed Cell Volume (PVC/determination) of haematocrit
(vi) ESR/Erythrocyte Sedimentation Rate (Westergreen's method)
(vii) ESR 12 (Wintrob's method)
(viii) Absolute Eoinophill count
(ix) Reticulocyte Count
(x) L.E. Cell preparation
(xi) Sickle Cell preparation
(xii) G6PD Test
(xiii) Detection of Foetal Hemolobin
(xiv) Osmotic Fragility of Red Blood Cells
(xv) BT, CT Bleeding Time, Clotting Time
(xvi) Prothrombin Time Estimation
(xvii) ABO grouping (Slide method)
(xviii) ABO grouping (Tube method)
(xix) Rh grouping (Slide method)
(xx) Direct Coomb's Test
(xxi) Indirect Coomb's Test
(xxii) Compatibility Testing for Blood Transfusion cross matching Test. (Major & Minor)
(xxiii) Quantitative Determination of Anti D Antibody Titre

TEACHING & EXAMINATION SCHEME

THIRD YEAR

Subjects	Distribution of Time Hours per week				Distribution of Max. Marks / Duration							Total Marks
					University Exam.				Sessional			
	L	T	P	Total	TH	Hrs	PR	Hrs	CT	TU	PR(S)	
Entrepreneurship & Professional Management	2	1	-	3	100	3	-	-	-	-	-	150
Environment Studies	2	-	1	3	100	3	-	-	-	-	50	150
Microbiology including Parasitology & Immunology	5	-	1	6	100	3	-	-	-	-	-	100
Pathology	5	-	1	6	100	3	-	-	-	-	-	100
Biochemistry	5	-	1	6	100	3	-	-	-	-	-	100
Clinical Practical Training-III	-	-	9	9	-	-	400	3	-	-	200	600
MLT Instruments Practice Lab-III	-	-	3	3	-	-	50	3	-	-	100	150
Hospital/ Industrial Trianing (4 weeks) in Summer Vacation							100					100
Total	**19**	**1**	**16**	**36**	**500**		**550**				**500**	**1450**

L : Lecture

T : Tutorial

P : Practical

TH : Marks for University's Examination for Theory

PR : Marks for University's Examination for Practical

CT : Marks for Class Tests

TU : Marks for Tutorials

PR(S) : Marks for Practical and Viva-voce

Paper-I: Entrepreneurship and Professional Management

1. Entrepreneurship:

1.1 Definition, basic concept, need, scope and characteristics of entrepreneurship.

1.2 Women entrepreneurship.

1.3 Assistance to small scale enterprises form national level organization like SIDO, NSIC, NRDC,m KVIC

1.4 Assistance to small scale enterprises from State level organization like DOI, DIG; RFC, SISI< RHDC, Pollution Control Board, Rajasthan Khadi &

1.5 Facilities to ~omen entrepreneurs.

2. Emerging Areas in Entrepreneurship:

2.1 Innovation & Creativity

2.2 Introduction to Intellectual Property Rights (IPRs) & Patents

2.3 National Knowledge Commission:: basic concept, need & scope

2.4 Service sector: scope & future trends

2.5 Energy & Auditing

3. Project formulation Process:

3.1 Steps in planning a small scale enterprise,

3.2 Structure of project report,

3.3 Analysis of sample, project reports

3.4 Preparation of project reports,

3.5 Techno-economic & Feasibility of the project.

4. Financial Sources for SSI Loan:

4.1 State Govt. RFC, Credit facilities by banks.

5. Roles & Regulation:

5.1 Licensing & regi'stration procedure .

5.2 Important provision of Factory, Act.

5.3 Shop & Commercial Establishment Act.

5.4 Sales of Goods Act.

5.5 Partnerspip Act.

5.6 Value Added Tax (VAT)

5.7 Service Tax

5.8 Professional Tax

5.9 Income Tax,

5.10 Sales tax & Excise rules

5.11 Municipal bye laws & insurance coverage.

6. Meaning and Scope of Business:

6.1 Definition of profession, trade and Industry.

6.2 Objective of business and profession.

6.3 Types of Business Organization:

6.4 Brief description, advantage and disadvantages of individual-partnership cooperative private and public limited organizations,

6.5 Characteristics of small business ethics, organization charts.

7. Management Techniques:

7.1 Leadership, authority, responsibility.

7.2 Functions of Management

8. Quality Control:

8.1 Meaning, importance of keeping standard.

8.2 Factors responsible for deviation from standards.

8.3 ISO and 180-9000 to 9006.

8.4 Total quality management.

9. **Financial Management:**

9.1 Sources of finance.

9.2 Brief idea of cash and credit, cheques, drafts, bill of exchanges, promissory note.

10. Marketing:

10.1 Basic concept.

10.2 Market promotion, market promotion.

10.3 Branding, packaging, pricing, planning and development.

10.4 Advertisement media and effectiveness.

10.5 Sales forecasting, marketing fix-princing policy, sales promotion and salesmanship.

10.6 After sales services, complaints and their redressal.

11. Human Relations:

11.1 Motivating the employers

11.2 Inter personnel relations,

11.3 Grievances and their banding

11.4 Staff requirement, training and monitoring.

12. Foreign Trade:

12.1 Export procedure.

12.2 Channels of distribution in export trade.

12.3 Export promotion.

12.4 Registration of firm/factory in R.B.I., AEPC or others.

Note: Entrepreneurship awareness camp should be arranged for 3 to 4 day at a stretch. No question will be asked in the examination from the topics under Entrepreneurship Awareness Camp.

Entrepreneurial Awareness Camp:

Topics to be covered in the camp:

1) Who is an entrepreneur?
2) Need for entrepreneurship, entrepreneuriai career and wage employment.
3) Scenario of development of small scale enterprises in India.
4) Entrepreneurial history in India, Indian values and entrepreneurship.
5) Assistance from District Industries Center. Commercial banks. State Financial Corporation. Small Industries Service Institutes. Research and Development laboratories & other financial and development corporations.
6) Considerations for product selection.
7) Opportunities for business, service & entrepreneurship ventures.
8) Learning from Indian experiences in entrepreneurship (Interaction with successful entrepreneurs should be arranged).

The camp can be arranged by the institution itself with the help of other agencies such as RHCO, DIC, Science & Technology Department, Rajcon, Deptt. of Industries, SISI, E.D. Cells etc.

Reference Books:

1. Hand Book of Small Scale Industry - P.M. Bhandari
2. Hand Book on Entrepreneurship Development - O/O. Harkut
3. Entrepreneurial Development - S.S. Khanka
4. Statistical Quality Control - Manohar Mahajan
5. ISO: 9000 Quality System – 2000 - S. Dalela
6. ISO: 14000
7. Organisation & Management of Small Scale Industries - Desai J.V. Himalaya, Bombay, 1985
8. Management of Small Scale Industries - 3rd, Himalaya, Bombay, 1986
9. The Story of an Entrepreneur - M. Nath, IMT Monograph
10. Small Industry Entrepreneurs Hand Book Service International - Mohan K.R., Bombay Productivity
11. Hand Book of Entrepreneurship – Rao & Pareek, New Delhi, Learning System 1978

Paper-II: Environmental Studies

Rationale

Environmental study is a subject as per directions of Supreme Court / Govt. of India. Under Art, 51 A (g) of our constitution it is our fundamental duty to protect our environment.

A diploma holder must have knowledge of different types of pollution and health hazards so that he/she may help in balancing the eco system and controlling pollution by pollution control measures. He/she should also be aware of environmental laws related to the control of pollution in general and bio-medical waste in particular.

1. General

1.1 Biotic and Abiotic environment.
1.2 Adverse effects of Environmental Pollution
1.3 Control Strategies
1.4 Various Acts and Regulations\

2. Water pollution

2.1 Water Quality Standards for potable water
2.2 Surface and underground water sources
2.3 Impurities in water and their removal
2.4 Denomination
2.5 Adverse effects of domestic waste water and industrial effluent to surface water sources
2.6 Eutrophication of lakes
2.7 Self purification of streams

3. Air pollution

3.1 Sources of air contaminants
3.2 Adverse effects on human health
3.3 Measurement of air quality standards and their permissible limits
3.4 Measures to check air pollution
3.5 Greenhouse effect
3.6 Global warming
3.7 Acid rain
3.8 Ozone depletion

4. Bio Medical Waste Management

4.1 Introduction to bio-medical waste
4.2 Types of bio-medical waste.
4.3 Collection of bio medical waste

5. Land Pollution

5.1 Soil conservation
5.2 Land erosion
5.3 Afforestation

6. Ecology:

6.1 Basics of species

6.2 Biodiversity
6.3 Population dynamics
6.4 Energy flow
6.5 Ecosystems

7. Social Issues and the Environment:

7.1 Sustainable development and Life Style.
7.2 Urban problems related to energy
7.3 Resettlement and rehabilitation of people
7.4 Energy flow
7.5 Consumerism and waste products.

8. Water Harvesting and Rural Sanitation

8.1 Water harvesting techniques
8.2 Different schemes of Rural Water Supply in Rajasthan
8.3 Rural Sanitation
8.4 Septic Tank
8.5 Collection and disposal of wastes.
8.6 Bio-gas
8.7 Community Awareness and participation

9. Miscellaneous:

9.1 Non-Conventional (Renewable) sources of energy
9.2 Solar energy, Wind energy, Bio-mass energy, Hydrogen energy

Practical Work

1. Visit to local air polluted site
2. Visit to local water polluted site
3. Visit to local area to document environmental assets mountain / desert / river / forest
4. Study of local birds, plants, insects
5. Plantation work
6. Environmental awareness campaign through exhibitions After visits study, the students will prepare posters, charts, reports.

Reference Books:

1. Environmental science – Comingham, Saigo
2. Solid waste management – C.I. mentall
3. Introduction to Environmental Engineering & Science – Gilbert M Masters, Prentice Hall of India, 1995
4. Concept of Ecology, 1991 – Edward J Kormondy
5. Ecology 975 - Odum
6. Environmental Engineering – Peavy, Rowa, Tehobaniglum
7. Environmental Impact Assessment – McGraw Hill, New York, 1977
8. Environmental Technologies for Sustainable Development – Dr. Upendra Pandel, Dr. M.P. Poonia
9. Environmental Pollution – V.K. Kohli & Vikas Kohli
10. Panda, Newsletter – WWF-India, New Delhi.

Paper-III: Microbiology Including Parasitology & Immunology

Human Parasitology

Protozoa: classification, morphology, life cycle & lab diagnoses of E. Histolytica, Giardia, Malarial parasite, Trichomonas, Leishmania, Trypanosome, Toxoplasma.

Nematodes: Classification, morphology, life cycle & lab diagnoses of Ascaris, Ankylostoma duodenale, Enterobius vermiculars, Tricuris trichiura, Stronglyoides, Dracunculus medinensis, Wucheria bancrofti, Onchocera.

Platyhelminths: Classification names with general outline morphology and life cycle of Taenia solium Tenia saginata Hymenolepis nana Echinococcus granulosus.

Systemic Bacteriology: Morphology, Culture Identification and lab diagnosis.

1. Gram Positive cocci: Staphylococcus, Streptococcus, Pneumococci
2. Green Negative Cocci: Neisseria
3. Gram Negative Bacilli: Classification of Enterobaetiriacae, Morphology, Culture, Biochemical Diagnosis, Lab Diagnosis, E-Coli, Klelbsiella, Enterobacter, Proteus, Salmonella, Shigella,Vibrio, Pseudomonas

Fastidious

1. Haemophilus
2. Gram Positive Bacilli
   - Morphology, Culture, Biochemical Identification and Lab Diagnosis.
   - Cornybacteriurn
   - Clostridium
   - Bacillus
3. Spirochetes - Morphology and Serological diagnosis (T. Pattidum)
4. Mycobacterium – Morphology, classification, identification by biochemical test.

Immunology

1. Antigen antibody reaction, Principles and Practical application of various types of Serological Test.
   a. Precipitation.
   b. Agglutination
   c. Compliment fixation test
   d. Neutralization ELISA,
   e. Radioimmunoassay,
   f. Electrophoresis
   g. Immunofluorescence
   h. Polymerase Chain Reaction.
2. Hyper sensitivity definition and type only morphology and serological diagnosis, morphology and serology diagnosis.
3. Molecular Diagnostic techniques in Microbiology.

Paper-IV: Pathology

Histopathology

General principles of Histopathological work - collection of specimen, numbering and giving tissue bits.

Equipments used in Histopathology, their merits and demerits and care Fixatives used in Histopathology-preparation advantage and disadvantage. Fixatives used in Histopathology-preparation advantage and disadvantage. Frozen section and cryostat and cryostat Technique, Staining & mounting morbid anatomy. Decalcification-method, advantages and disadvantages each method. Decalcification - method.

Cytopathology

Introduction of Cytopathology, methods of collection of materials making smears and preparation of Fixatives used.

Different stains used, their preparation and staining the smears. Barr-bodies (sex chromatin)

Histopathology Techniques

Morbid anatomy

Tissue processing - fixation, dehydration, clearing and impregnation.

Making of blocks & section cutting, errors in section cutting their correction. Different types of H & E stains.

Preparation of different types of special stains. Histochemical and cytochemical techniques. Immunohistocytochemistry.

Hematology

Investigation of bleeding disorders - normal coagulation cascade. BT, CT, methods and interpretation.

Clot retraction time.

Prothrombin time.

Activated partial thromboplastin time, PT & FDP

Bio Statistics

Measures of ,central tendency - Mean, mode, median. Probability, Standard Deviation, Standard error, coefficient of variation, Logs and antilog graphical representation of statical data. Test of significance. Correlation and regression. F-Test, t-test, chai square test, student test.

Paper-V: Biochemistry

1. Digestion, absorption, and assimilation of Carbohydrates, blood, Sugar, Regulation of blood Sugar, glycolysis, TCA Cycle, Glyeogenesis, glycogenolysis, GTT, metabolic disease associated with carbohydrate metabolism, diabetes mellitus, glycated hemoglobin
2. Digestion absorption of Proteins, amine acids, urea associated. Distt amino acid. Metabolism, electrophorelic separation of proteins
3. Digestion and absorption and assimilation of lipids, Kelone bodies formation, metabolism, disorders associated with lipids, cholesterols and lipoprotein metabolism.
4. Metabolic disorders associated with Nucleic acid metabolism, gont etc.
5. Kidney function test, urine formation, normal and abnormal constituents
6. Liver function test 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 constituents, hemoglobin, hence Biosynthesis, Porphyries.
10. C.S.F. and its composition and diagnosis significance
11. Constituents of gastric juice and diagnostic importance
12. Principle of Special investigations like RIA, ELISA and
13. Normal Values, Normal range, Interpretative clinical chemistry, quality controls – internal/and external.
14. Automation in clinical investigation. Auto and Semi auto analyzes continuous flow analyzers, deserted analyzers, batch analyzers, random access auto analyzers, dry chemistry analyzers – Reagent File
15. Recording of Patients date, reporting values preparation of investigation, statistics.
16. Chromatography, various modes of chromatography.
17. Definition of Buffer solution, Normal Solution % Solution, Molar Solution, Saturated solution "Molar Solution, Saturated Solution, Substrate Solution.
18. Difference of HB Electrophoresis and Protein Electrophoresis
19. Immunochemical techniques.
20. Blot techniques.

Paper-VI: Clinical Practical Training-III

Rationale

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

Contents

Practical related to theory paper I.C. cytology, Bacteriology, Parasitology and Pathology.

1. Introduction to equipments
2. Simple usage
3. Indication & Contraindications use
4. Repair & maintenance of equipments used in laboratory.
5. Microscope.
6. Centrifuge.
7. Serological water Both 37°C
8. Micropipette.

Reference Books

1. Medical laboratory manual for Tropical countries Volume-I & II – Monica Chesbrongli, ELBS Edition.
2. Medical Laboratory, Technology – A proceedun manual for routine Diagnosis Test Volume-I, II & III – K.L. Mukerjee

Paper-VII: MLT Instruments Practice Lab-III

1. Introduction to equipments.
2. Simple usage
3. Indication and contraindication
4. Repair and maintenance of instruments
5. Semi auto and fully automatic analyzer
6. Fully automatic cells counts
7. Flam Photometer
8. Colorimeter
9. Centrifuge, Different types.
10. Microscope, monocular, Bin ocular, Dark field immersion. Microscope.
11. Microtome (Different Types)
12. Balance (Different Types.)
13. Autoclave
14. Hot Air Oven, Serological oven
15. Water Bath (Different –Types)
16. Millipore filler and use
17. Ph meter
18. Automatic Tissue processor
19. Automatic Cover shipper