3.1 CLINICAL MICROBIOLOGY- III

(Parasitology and virology)

L	T	P
3	-	3

RATIONALE

The students undergoing training of medical laboratory technology learn the techniques of collection of samples, their processing and identification of various pathogens like parasites and viruses by using different techniques. In addition to the above, students are given training in the use of safety measures while handling infected material. The training is aimed at making the students competent to identify the causative parasites and viruses for microbial infections.

DETAILED CONTENTS

Theory

1. Introduction to medical parasitology (02 hrs)

2. General characteristics, morphology, classification (02 hrs)

   2.1 Protozoa
   2.2 Helminthes

3. Laboratory Samples for detection of parasites (02 hrs)

   Collection, transportation, processing and preservation of samples for routine investigations – Blood, stool

4. Concentration techniques (06 hrs)

   - Principle and application of concentration techniques of stool for demonstration of ova and cysts

5. Giardia and Entamoeba histolytica (05 hrs)

   - Morphology
   - Life cycle
   - Lab diagnosis

6. Ancylostoma and Ascaris lumbricoides (06 hrs)
   - Morphology
   - Life cycle
   - Lab diagnosis

7. T solium, T saginata (05 hrs)
   - Morphology
   - Life cycle
   - Lab diagnosis

8. Malarial Parasite (P. Vivax and P. Falciparum) (06 hrs)
   - Morphology
   - Life cycle
   - Lab diagnosis

9. Virology (04 hrs)
   - Introduction
   - General Characteristics, Classification Structure of viruses.

10. Medically important viruses (06 hrs)

    Pathogenicity, Lab diagnosis and prevention of –

    - Rabies
    - Polio
    - HIV
    - HBV (Hepatitis 'B' virus)

11. Virological Samples (04 hrs)
    - Collection
    - Transportation
    - Storage

LIST OF PRACTICALS

1. Collection and routine stool examination for detection of intestinal parasites
   - Saline preparation
   - Lugol's Iodine preparation
   - Concentration methods
     a) Floatation method (saturated salt solution/zinc sulphate)
     b) Sedimentation method (formal ether)

2. Identification of following adult worms/cyst from preserved specimen/slides
   - Tapeworm
   - Roundworm
   - Hookworm
   - Giardia
   - Entamoeba . histolytica, E. coli

3. Preparation of smear and identification of blood parasites
   - Preparation of stains (Leishman, Giemsa, Field)
   - Preparation of thin and thick smears
   - Staining of smears by Leishman, Giemsa, Field
   - Examination of smears for malarial parasite (P. vivax and P. falciparum)
   - Demonstration of various stages of malarial parasite from stained slides

INSTRUCTIONAL STRATEGY

The teacher should lay emphasis on common names, morphology of helminith and blood parasites. The students should be shown diagrams/illustration/permanent fixed slides and audio-visual aids. The students should be made aware about medically important viruses, collection and cultivation of viruses.

RECOMMENDED BOOKS

1. Parasitology by KD Chatterjee; Chatterjee Medical Publishers, Kolkatta
2. Medical Parasitology by Arora & Arora
3. An introduction to Medical Laboratory Technology by FJ Baker; Butterworth Heinemann Oxford
4. Text Book of Medical Microbilogy by Satish Gupta; JP Brothers, New Delhi
5. Textbook of Microbiology by Ananthanarayan and Panikar; Orient Longman, Hyderabad
6. Text Book of Medical Laboratory Technology by Praful B Godkar; Bhalani Publishing House; Mumbai
7. Medical Laboratory Manual for Tropical Countries Vol. I and II by Monica Cheesbrough; Cambridge University Press; UK
8. Practical Book of Medical Microbiology by Satish Gupta; JP Brothers, New Delhi
9. Medical Laboratory Science Theory and Practice by J Ochei and A Kolhatkar
10. Medical Laboratory Science by J. Achie and Kolhatkar, Tata McGraw Hill
11. Medical Laboratory Technology by Kanai Lal Mukherjee; Tata McGraw Hill Publishers, New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Hrs)	Marks Allotted (%)
1	02	04
2	02	06
3	02	06
4	06	08
5	05	06
6	06	14
7	05	10
8	06	14
9	04	08
10	06	12
11	04	12
Total	**48**	**100**

3.2 HAEMATOLOGY - III

L	T	P
3	-	3

RATIONALE

This subject aims to enable the students to carry out routine clinical laboratory investigation (blood, urine etc). He/she should be able to provide technical help for selected sophisticated hematological techniques with adequate knowledge of various principles. The training in laboratory safety is also provided.

DETAILED CONTENTS

Theory

1. Erythrocyte sedimentation rate (ESR) and packed cell volume (PCV) (12 hrs)
   - 1.1 Introduction
   - 1.2 Various methods of estimation of ESR and PCV and their merits and demerits
   - 1.3 Factors involved in ESR
   - 1.4 Interpretation of results

2. Red Cell Indicies – MCV, MCH, MCHC (05 hrs)

   Definition, reference range, calculation and interpretation

3. Supravital stain and reticulocyte counting (07 hrs)

   - 3.1 Introduction
   - 3.2 Principle and procedure of staining and calculation
   - 3.3 Reference values and interpretation
   - 3.4 Variation in Physiological Values such as Hb, PCV, T.L.C. and Platelet count

4. Anemias (16 hrs)

   - 4.1 Definition and classification
   - 4.2 Laboratory diagnosis of:
     - (a) Iron deficiency anaemia
     - (b) Megaloblastic anaemia
     - (c) Haemolytic anaemias including sickle cell anaemia thallasseamia
     - (d) Aplastic anaemia

5. Red cell fragility test (08 hrs)
   - 5.1 Principle and procedure
   - 5.2 Clinical significance

LIST OF PRACTICALS

1. ESR estimations (wintrobe and westergren) in blood sample
2. Determination of PCV (wintrobe and capillary) in blood by Macro and Micro Methods
3. Counting of Reticulocyte in blood
4. To perform red cell fragility test on blood
5. To perform Sickling test on blood
6. Estimation of foetal haemoglobin by alkali denaturation test
7. Estimation of plasma haemoglobin
8. Estimation of and G_6PD by Methylene Blue Reduction Test)

INSTRUCTIONAL STRATEGY

Teachers should lay emphasis on concepts and principles while covering the subject contents. In the practical work, the students should be given opportunity to do practical work individually but under supervision.

Visits to hospital/medical colleges should be planned to demonstrate the processes. It is important to make use of models and audiovisual aids to show specific processes. Experts should be invited to deliver lectures on specific topics and share their experiences.

RECOMMENDED BOOKS

1. Medical Laboratory Technology Vol. 1 by KL Mukherjee; Tata McGraw Hill Publishing Company, New Delhi

2. An Introduction to Medical Laboratory Technology by FJ Baker; Butterworths Heinenmann, Oxford

3. Medical Laboratory Manual for Tropical Countries by Monica Cheesbrough; Cambridge University Press; UK

4. Textbook of Medical Laboratory Technology by Praful B Godkar; Bhalani Publishing House, Mumbai

5. Practical Haematology by J.V Decie; ELBS with Churchill Living Stone, UK

6. Medical Laboratory Science Theory and Practical by J. Ochei and Kolhatkar; Tata McGraw Hill Publishing Company Ltd., New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Hrs)	Marks Allotted (%)
1	12	30
2	05	08
3	07	15
4	16	35
5	08	12
Total	**48**	**100**

3.3 CLINICAL BIOCHEMISTRY- III

L	T	P
3	-	3

RATIONALE

The students are imparted basic training of theoretical and practical aspects in the field of clinical biochemistry. The students are made to learn the techniques of collection of clinical samples and their processing along with recording of data. The student will also obtain the basic knowledge of chemistry and metabolism of various metabolites which are routinely estimated in different diseases so that a clear understanding of the different tests is obtained. The students are also given basic training in safety measures, quality control and automation

DETAILED CONTENTS

Theory

1. Serum Bilirubin (06 hrs)

    1.1 Formation of bile pigments
    1.2 Formation and excretion of bilirubin
    1.3 Conjugated and unconjugated bilirubin
    1.4 Principle and procedures of serum bilirubin estimation (Direct & Indirect)
    1.5 Reference values
    1.6 Clinical significance

2. SGOT and SGPT (06 hrs)

    2.1 Principle and procedures of estimation
    2.2 Reference values
    2.3 Clinical significance

3. ALP and ACP (06 hrs)

    3.1 Principle and procedures of estimation
    3.2 Reference values
    3.3 Clinical significance

4. Serum Amylase (03 hrs)

    4.1 Principle and procedures of estimation
    4.2 Reference values
    4.3 Clinical significance

5. Serum Calcium and Phosphorus (04 hrs)

5.1 Principle and procedures of estimation
5.2 Reference values
5.3 Clinical significance

6. Lipid Profile (10 hrs)

6.1 Formation of cholesterol
6.2 High density and low density cholesterol
6.3. Principles and procedures of estimation
6.4. Reference value
6.5 Clinical significance
6.6 Triglycerides, principle and procedure of estimation
6.7. Importance of various ratios of HDL, LDL and VLDL

7 Urinary Proteins and Creatnine (04 hrs)

7.1. 24 hr. urinary proteins and creatnine estimation
7.2. Reference values
7.3. Clinical significance

8. Renal Function Tests (Renal clearance Tests) (09 hrs)

8.1 Urea clearance Test
8.2. Creatnine clearance test
8.3 Their Clinical significance

LIST OF PRACTICALS

1. Serum bilirubin estimation
2. Phosphorus estimation
3. Calcium estimation
4. Renal clearance tests
5. SGOT estimation
6. SGPT estimation
7. ALP estimation
8. ACP estimation
9. Total cholesterol estimation
10. Triglyceride estimation
11. Estimation of HDL and calculation of VLDL and LDL
12. Urinary protein and creatinine estimation (24 hr)
13. Estimation of serum amylase

INSTRUCTIONAL STRATEGY

Teachers should lay emphasis on concepts and principles while covering the subject contents. In the practical work, the students should be given opportunity to do practical work individually but under supervision.

RECOMMENDED BOOKS

1. A Procedure Manual for Routine Diagnostic Tests Vol. I, II and III by KL Mukherjee; Tata McGraw Hill Publishers, New Delhi
2. Practical Clinical Biochemistry by H. Varley; Heinmann Publishers, Oxford
3. A Text Book of Medical Laboratory Technology by P Godkar; Bhalani Publishers, Mumbai
4. Medical Laboratory Science, Theory and Practice by J Ochaie and A Kolhatkar, Tata McGraw Hill

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Hrs)	Marks Allotted (%)
1	06	12
2	06	12
3	06	12
4	03	06
5	04	08
6	10	22
7	04	08
8	09	20
Total	**48**	**100**

3.4 HISTOPATHOLOGY AND CYTOLOGY- I

L	T	P
3	-	3

RATIONALE

This part of the subject is aimed at introducing the students to the various types of tissue preparations and developing expertise in the students to cut very thin tissue sections from tissue blocks and facilitate visualization using various stains and dyes. Cytology part aims at exposing the students to the latest advancements in cytological investigations.

DETAILED CONTENTS

Theory

1. Introduction and definition of: (01 hr)

    1.1 Histology
    1.2 Histopathology
    1.3 Biopsy
    1.4 Autopsy
    1.5 Autolysis
    1.6 Putrefaction

2. Preparation of Tissue (Different Methods of Preparation of Tissue) (02 hrs)

    2.1 Unfixed Tissue preparations

        2.1.1. Imprint methods – Impression Smears
        2.1.2 Teased preparation
        2.1.3 Squashed preparation
        2.1.4 Frozen section

    2.2 Fixed Tissue preparations (introduction only)

        2.2.1 Paraffin embedding
        2.2.2 Celloidin embedding
        2.2.3 Gelatin embedding

3. Reception of Specimen (01 hr)

    3.1 Reception, recording, labeling and preservation of histological specimen

4. Fixation (Histological Specimens) (06 hrs)

    4.1 Classification of fixatives
    4.2 Composition of various fixatives
    4.3 Advantages and disadvantages

5. Processing (by Paraffin Technique) (06 hrs)

5.1 Dehydration
5.2 Clearing/Dealcoholization
5.3 Infilteration and impregnation
5.4 Paraffin embedding
5.5 Automation: Histokinete (automatic tissue processor)
- its types, working, care and maintenance

6. Microtomy (07 hrs)

6.1 Microtome

6.1.1 Types
6.1.2 Advantages and disadvantages
6.1.3 Working principle, care and maintenance

6.2 Microtome Knives

6.2.1 Various types of knives
6.2.2 Sharpening of knives

- Honing technique
- Stropping technique
- Automation: Automatic knife sharpener – uses, care and maintenance
- Uses of abrasives and lubricants

6.2.3. Introduction to disposable blades - their advantages and disadvantages.

6.3 Section Cutting

6.3.1 Rough cutting
6.3.2 Fine cutting
6.3.3 Use of tissue floatation bath
6.3.4 Use of various adhesive media and lifting of sections to the slide
6.3.5 Errors /cutting faults in sections and their remedies

7. Theory of staining (Routine) (05 hrs)

7.1 Principle and mechanism of routine stain (Haematoxylin and Eosin)
7.2 Various steps of staining (Haematoxylin and Eosin)

- Deparaffinization
- Hydration
- Nuclear Staining
- Differentiation
- Blueing
- Counterstaining
- Dehydration
- Clearing and Mounting
- Results

7.3 Automation: Use of automatic stainer and coverslipper

8. Mountants (02 hrs)

8.1 Various types of mounting media (aqueous, resinous)
8.2 Advantages and Disadvantages

9. Various Terms associated with staining (04 hrs)
9.1 Solvents
9.2 Mordants
9.3 Metachromasia
9.4 Accelerators
9.5 Progressive and regressive staining
9.6 Use of controls in staining and their significance

10. Cell (02 hrs)

10.1 Defination and function
10.2 Structure
10.3 Multiplication (Mitosis and Meiosis)

11. Exfoliative Cytology (04 hrs)

11.1 Introduction
11.2 Preparation of vaginal & cervical smears
11.3 Collection and Processing of specimen for cytology

- Urine
- Sputum
- CSF (Cerebro Spinal Fluid)
- Other fluids

12. Fixation (Cytological Specimen) (02 hrs)

12.1 Definition
12.2 Various types of Cytological fixatives
12.3 Advantages and Disadvantages

13. Cytological Staining (0 4 hrs)

Principle, Technique and interpretation of results in

- Papanicalaou staining
- May Grunwald & Giemsa staining
- Haematoxylin and Eosin staining

14 Role of Laminar airflow and cytotechnician in cytology (02 hrs)

LIST OF PRACTICALS

1. Reception of specimen, labeling and preserving the specimen
2. Preparation of various smears by unfixed methods
   - Imprint smears
   - Teased smears
   - Squashed smears
3. Preparation of different fixatives with special emphasis on preparation of formaline based fixatives
4. Preparation of paraffin blocks from various tissue pieces and labeling with emphasis on orientation
5. Handling of microtome
6. Sharpening of microtome knives
7. Preparation of blocks for fine cutting
   - Rough cutting
   - Trimming
8. Practice of fine section cutting
9. Practice of lifting of sections on the slides
10. Performing H&E staining on sections and mounting of tissue sections
11. Demonstration of cell using buccal smear/urine sample
12. Processing of urine samples for malignant cells
13. Processing of sputum sample for malignant cytology
14. To perform PAP stain on given smear
15. To perform MGG stain on given smear
16. To perform H&E on given smear
17. To demonstrate various automation by use of brochures, charts etc.

INSTRUCTIONAL STRATEGY

Teachers should lay emphasis on concepts and principles while covering the subject contents. In the practical work, the students should be given opportunity to do practical work individually. Visits to hospital/medical colleges should be planned to demonstrate the processes. It is important to make use of models and audiovisual aids to show specific processes. Experts should be invited to deliver lecture on specific topics and share their experiences.

RECOMMENDED BOOKS

1. An Introduction to Medical Laboratory Technology by FJ Baker; Butterworths Scientific, London
2. Carleton's Histological Technique by RAB, Drury, MADM (OXON), FRC Path, Northwick Paru Hospital, Harrow, Middlesex
3. Theory and Practice of Histological Technique by John D. Bancroft, Churchill Livingstone, London
4. Cellular Pathology Techniques by CFA Culling, Butterworths, London
5. Medical Lab Technology by Dr. Ramnik Sood, MD, Maulana Azad College, New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	01	02
2	02	04
3	01	02
4	06	13
5	06	13
6	07	14
7	05	12
8	02	04
9	04	08
10	02	04
11	04	08
12	02	04
13	04	08
14	02	04
Total	**48**	**100**

3.5 BASICS OF INFORMATION TECHNOLOGY

L	T	P
-	-	4

RATIONALE

Information technology has great influence on all aspects of our life. Primary purpose of using computer is to make the life easier. Almost all work places and living environment are being computerized. The subject introduces the fundamentals of computer system for using various hardware and software components. In order to prepare diploma holders to work in these environments, it is essential that they are exposed to various aspects of information technology such as understanding the concept of information technology and its scope; operating a computer; use of various tools of MS Office/Open Office and internet form the broad competency profile of diploma holders. This exposure will enable the students to enter their professions with confidence, live in a harmonious way and contribute to the productivity.

Note:

Explanation of Introductory part should be dovetailed with practical work. Following topics may be explained in the laboratory along with the practical exercises. There will not be any theory examination.

TOPICS TO BE EXPLAINED THROUGH DEMONSTRATION

1. Information Technology – its concept and scope, applications of IT, ethics and future with information technology
2. Impact of computer and IT in society.-- Computer application in office, book publishing, data analysis, accounting, investment, inventory control, graphics, air and railway ticket reservation, robotics, military, banks, Insurance financial transactions and many more
3. Generations of computer, block diagram of a computer, CPU, memory, data – numeric data, alpha numeric data, processing of data.
4. Computers for information storage, information seeking, information processing and information transmission, computer organization, computer hardware and software; primary and secondary memory: RAM, ROM, PROM etc. Input devices; keyboard, mouse, scanner, etc ; output devices ; VDU and Printer(Impact and non-Impact printers), Plotter etc. Primary and Secondary Storage (Auxiliary Storage), Secondary storage; magnetic disks – tracks and sectors, optical disk (CD, CD-RW and DVD Memory)
5. Introduction to Operating Systems such as MS-DOS and Windows, difference between DOS and Windows
6. Basics of Networking – LAN, MAN,WAN

LIST OF PRACTICALS

1. Identify and list functions of various components and peripherals of given computer.
2. Installation of operating system viz. * Windows XP, *Windows 2007 etc.
3. Installing a computer system by giving connection and loading the system software and application software and various sources to install software
4. Exercises on entering text and data (Typing Practice)
5. Features of Windows as an operating system:
   a) Start , shutdown and restore
   b) Creating and operating on the icons
   c) Opening, closing and resizing the windows
   d) Using elementary job commands like – creating, saving, modifying, renaming, finding and deleting a file , creating and operating on a folder
   e) Introduction to all properties such as changing settings like, date, time, calculator, colour (back ground and fore ground)
   f) Using short cuts
6. Word Processing (MS Office/Open Office)

   a) File Management:

      Opening, creating and saving a document, locating files, copying contents in some different file(s)

   b) Editing a document:

      - Entering text, cut, copy, paste using toolbars
      - Use of spell check
      - PDF file and its conversion in different file formats (MS Word/Excel etc.)
      - Scanning, editing and printing of a document

   c) Formatting a document:

      - Using different fonts, changing font size and colour, changing the appearance through bold/ italic/ underlined, highlighting a text, changing case, using subscript and superscript, using different underline methods
      - Aligning of text in a document, justification of document ,Inserting bullets and numbering

- Formatting paragraph, inserting page breaks and column breaks, line spacing
- Use of headers, footers, inserting footnote, end note, use of comments
- Inserting date, time, special symbols, importing graphic images, drawing tools

d) Tables and Borders:

- Creating a table, formatting cells, use of different border styles, shading in tables, merging of cells, partition of cells, inserting and deleting a row in a table
- How to change docx file to doc file
- Print preview, zoom, page set up, printing options
- Using Find, Replace options

7. Spread Sheet Processing (MS Office/Open Office)

a) Starting Excel

open worksheet, enter, edit data, formulae to calculate values, format data, create chart, printing chart, save worksheet, switching between different spread sheets

b) Menu commands:

Create, format charts, organize, manage data, solving problem by analyzing data, creating graphs

c) Work books:

- Managing workbooks (create, open, close, save, rename), working in work books
- Editing a worksheet: copying, moving cells, pasting, inserting, deleting cells, rows, columns, find and replace text, numbers of cells, formatting worksheet

d) Creating a chart:

- Working with chart types, changing data in chart, formatting a chart, use chart to analyze data
- Using a list to organize data, sorting and filtering data in list

e) Formulas:

Addition, subtraction, division, multiplication, percentage and auto sum

8. Power Point Presentation (MS Office/Open Office)

a) Introduction to PowerPoint
- How to start PowerPoint
- Working environment: concept of toolbars, slide layout, templates etc.
- Opening a new/existing presentation
- Different views for viewing slides in a presentation: normal, slide sorter etc.

b) Addition, deletion and saving of slides

c) Insertion of multimedia elements
- Adding text boxes, importing pictures, tables and charts etc.

d) Formatting slides
- Text formatting, changing slide layout, changing slide colour scheme
- Changing background, Applying design template

e) How to view the slide show?
- Viewing the presentation using slide navigator, Slide transition
- Animation effects etc.

9. Antivirus

a) What is virus and its types

b) Problems due to virus

c) Installation and updation of antivirus (anyone out of Kaspersky, Mcafee, Norton, Quickheal etc).

d) How to scan and remove the virus

10. Internet and its Applications

a) Log-in to internet, introduction to search engine

Browsing and down loading of information from internet

b) Creating e-Mail Account
- Log in to e-mail account and Log out from e-mail account

c) Managing e-Mail
- Creating a message
- Sending, receiving and forwarding a message
- Attaching a file
- Deleting a message

INSTRUCTIONAL STRATEGY

Since this subject is practical oriented, the teacher should demonstrate the capabilities of computers to students while doing practical exercises. The students should be made familiar with computer parts, peripherals etc. and proficient in making use of MS Office/Open Office in addition to working on internet. The student should be made capable of working on computers independently. This subject should be taught with the help of LCD projector, (while teaching a group) using PowerPoint presentation slides.

RECOMMENDED BOOKS

1. Fundamentals of Computer by E Balagurusamy,Tata McGraw Hill Education Pvt. Ltd, New Delhi
2. Fundamentals of Computer by V Rajaraman; Prentice Hall of India Pvt. Ltd., New Delhi
3. Fundamentals of Computer by Sumita Arora by Dhanpat Rai and Co , New Delhi
4. Computers Today by SK Basandara, Galgotia Publication Pvt Ltd. Daryaganj, New Delhi.
5. Internet for Every One by Alexis Leon and Mathews Leon; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
6. A First Course in Computer by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
7. Computer Fundamentals by PK Sinha; BPB Publication, New Delhi
8. Fundamentals of Information Technology by Leon and Leon; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
9. Information Technology for Management by Henery Lucas; Tata McGraw Hill Education Pvt Ltd , New Delhi
10. MS Office by BPB Publications, New Delhi

3.6 TRANSFUSION MEDICINE

(Blood Banking)

L	T	P
3	-	2

RATIONALE

Blood transfusion has become a life saving procedure in modern medical sciences. To avoid any mistake, the students must understand to learn the blood bank procedures, such as ABO & Rh blood grouping carefully and accurately. He must also have an adequate knowledge of cross matching both major and minor procedures as well as selection of a suitable donor. He should be competent enough to collect blood and its long-term preservation for safe blood transfusion.

DETAILED CONTENTS

1. Historical introduction to Transfusion medicine (blood banking) (02 hrs)

2. Antigen and Antibody (03 hrs)
   - 2.1 Definition of antigen and antibody
   - 2.2 Classification of antigens and antibodies.

3. ABO Blood Group System (04 hrs)
   - 3.1 Antigens and antibodies involved
   - 3.2 Principle and procedure of ABO blood grouping
   - 3.3 Various blood sub groups (A_1,A_2, A_1B, A_2B)

4 The Rh Blood Group System (04 hrs)
   - 4.1 Antigen and antibody involved
   - 4.2 Principle and procedure of Rh grouping
   - 4.3 Variant of D antigen (Du)

5. Anticoagulants used in blood bank (04 hrs)
   - 5.1 Types and composition of various anticoagulants
   - 5.2. Advantages and disadvantages of various anticoagulants

6 Criteria for selection of Donor (02 hrs)

7 Blood Collection and storage (03 hrs)

   - 7.1. Screening of blood donor and characteristics of ideal blood donor.
   - 7.2 Blood collection procedure
   - 7.3. Transportation and storage

8. Screening of blood donors for: (10 hrs)
   - 8.1 MP
   - 8.2 VDRL
   - 8.3 HIV
   - 8.4 HbsAg
   - 8.5 HCV

9. Cross Matching (02 hrs)

   - 9.1 Types of cross matching
   - 9.2 Various methods and their procedures

10. Coombs Test (04 hrs)

    - 10.1 Direct coombs test (principle, procedure, importance and application)
    - 10.2 Indirect coombs test (principle, procedure, importance and application)

11. Various blood components (Packed cells, Fresh frozen plasma, Cryoprecipitate, PRP(Platelet rich plasma)) (04 hrs)

    - 11.1 Preparation
    - 11.2 Preservation
    - 11.3 Uses

12. Blood Transfusion reactions (06 hrs)

LIST OF PRACTICALS

1. Performing ABO blood grouping by following method:

   - Direct
   - Tube Test
   - Indirect (reverse)
   - Subgroup

2. Performing-Rh grouping by following techniques:
   - Slide
   - Tube technique

3. Performance of Coombs Test
   - Direct
   - Indirect

4. Cross Matching (compatibility testing)

   - Major
   - Minor

5. Preparation of anticoagulants

   - ACD (Acid Citrate Dextrose)
   - CPD (Citrate Phosphate Dextrose)
   - CPDA (Citrate Phosphate Dextrose Adenine)

6 Malarial Parasite test by Thick and Thin smear preparation
7 VDRL Test
8 HIV Test
9 HbsAg Test
10 HCV Test
11 Preparation of platelet rich plasma and platelet poor plasma

INSTRUCTIONAL STRATEGY

Teachers should lay emphasis on concepts and principles while covering the subject contents. In the practical work, the students should be given opportunity to do practical work individually.

Visits to hospital/medical colleges should be planned to demonstrate the processes. It is important to make use of models and audiovisual aids to show specific processes. Experts should be invited to deliver lecture on specific topics and share their experiences.

RECOMMENDED BOOKS

1. Introduction to Modern Lab Technology by FJ Baker, Butterworth, Heinemann Publishers Oxford
2. Text book of Modern Lab Technology by Praful and Godker, Bhalani Publisher, Mumbai
3. Modern Lab Technology – A Procedure Manual for Routine Diagnostic Test by Kanai L. Mukerjee, Volume 1, Tata McGraw Hill Publishing, New Delhi
4. Modern Blood Banking and Transfusion Practices by Denise M Harmering, Jay Pee Brothers, New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Hrs)	Marks Allotted (%)
1	02	04
2	03	06
3	04	08
4	04	08
5	04	08
6.	02	04
7	03	06
8	10	22
9	02	04
10	04	08
11	04	08
12	06	14
Total	**48**	**100**

3.7 EMPLOYABILITY SKILLS – I

L	T	P
-	-	2

RATIONALE

The present day world requires professionals who are not only well qualified and competent but also possess good communication skills. Our diploma students not only need to possess subject related knowledge but also soft skills to get good jobs or to rise steadily at their work place. The objective of this subject is to prepare students for employability in job market and survive in cut throat competition among professionals.

DETAILED CONTENTS

1. Writing skills (08 hrs)

   i) Official and business correspondence
   ii) Job application - covering letter and resume
   iii) Report writing - key features and kinds

2. Oral Communication Skills (20 hrs)

   i) Giving advice
   ii) Making comparisons
   iii) Agreeing and disagreeing
   iv) Taking turns in conversation
   v) Fixing and cancelling appointments

3. Generic Skills (04 hrs)

   i) Stress management
   ii) Time management
   iii) Negotiations and conflict resolution
   iv) Team work and leadership qualities