VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

DIPLOMA IN MEDICAL TECHNOLOGY
(EFFECTIVE FROM JUNE 2000)

Diploma in Medical Technology is a one year Post-Graduate (Post B.Sc.) course. A student offering this course will study papers I, II, III and IV and practicals based on these papers.

The teaching per week for 4 papers is 16 hours and there are 16 hours per week for practicals.

The total marks of papers are 280 for University examination, distributed as 70 of each paper of 3 hours duration and the internal evaluation is of 120 marks distributed as 30 of each paper. The total marks of practicals are 210 for University examination distributed as 54 for practical paper I and Practicals papers II,III and IV are each of 52 marks. The internal evaluation for practicals is of 90 marks distributed as 24,22,22 and 22 for practicals based on paper I, II, III, and IV respectively. The University examination for practicals based on Paper I is of 12 hours, distributed over a period of 2 days and for practicals based on papers I, II, III and IV are of one day each and 6 hours per day.

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DIPLOMA IN MEDICAL TECHNOLOGY

(EFFECTIVE FROM JULY 2000)

PAPER – I : MICROBIOLOGY AND IMMUNOLOGY

SECTION – I : MICROBIOLOGY

(1) **EVALUATION AND HISTORY OF MICROBIOLOGY**

Introduction – Microbiology. Contribution of the following in Medical Technology – Leeuwenhock, Louis Pasteur, Robert Koch, Edward Jenner, Lord Lister, Iwanowaski, Paul Ehrlich, Domagk, Alexander Fleming, Elie Metchinkoff, Durham, Widal and Landsteiner.

(2) **CLASSIFICATION OF MICROGANISMS :**

Introduction – Microorganism. Group of Microorganism, Place of Microorganism in living world. Difference between Prokaryotes and Eukaryotes. The world of bacteria – Bergey's Manual of Determinative Bacteriology – its past and present status of classification systems.

(3) **MICOSCOPIC EXAMINTAION OF MICROORGANISMS** :

Introduction. Light microscope and Electron microscope. Bright Field microscopy, Dark Field Microscopy, Fluorescence microscopy, Phase contrast microscopy, Electron microscopy. Preparation of microorganism for Light Microscopic examinations; Wet mount and Hanging drop techniques and staining techniques – Simple staining, Gram staining, Acid Fast staining, Metachromatic granules staining, Spore staining, Flagella staining, Negative staining and Silver impregnation method.

(4) **CULTIVATION OF BACTERIA** :

Nutritional requirements, Nutritional types of Bacteria, Bacteriological media, Physical condition for growth, choice of media and conditions of incubation (Both for aerobic and anaerobic cultures).

(5) **PURE CULTURES AND CULTURAL CHARACTERISTICS** :

Introduction. Pure culture and mixed culture. Methods of isolating pure cultures, Maintenance and preservation of pure cultures. Culture characteristics – Growth on agar slants, Growth in broth, Growth in stabs; Colony characteristic, characteristics of broth cultures.

(6) **STERILIZATION AND DISINFECTION** :
Introduction. Definition of the terms : Sterilization, Disinfections and disinfectant, Antiseptic, Sanitizer, Germicide, Bactericide , Bacteriostatic, Sepsis, Asepsis and Antimicrobial agent. Factors affecting sterilization and disinfections. Sterilization by Heat, Chemicals, Radiation and Filtration. Characteristics of ideal disinfectant. Major groups of Chemical agents as disinfectants, Evaluation of disinfectants.

(7) **CLINICAL SPECIMENS AND IDENTIFICATION OF PATHOGENS :**
Collection, transportation, preservation and processing of clinical specimens for (i) Blood Cultures (ii) Urine cultures (iii) Sputum cultures (iv) CSF cultures (v) other body fluids, aspirates, tissues and pus. Isolation and identification of pathogens from clinical specimens. Importance and techniques of antibiotic susceptibility test in vitro. Determination of MIC, MBC and LD50.

(8) **BACTERIA OF MEDICAL IMPORTANCE** :
[A] Isolation and characterization of following medically important bacteria :

1. Staphylococcus.
2. Streptococcus
3. Salmonella, Shigella, Proteus, Escherichia. Enterobacter, Pseudomonas, Klebsiella.
4. Haemophilus, Bordetella and Neisseria.
5. Treponema.
6. Vibrio.
7. Corynebacterium.
8. Mycobacterium.

[B] 1. Anaerobic bacteria of medical importance.
2. Outline of Medical Mycology & Virology.

(9) **BIOSAFETY** :
Principles of biosafety, decontamination and disposal of wastes.

SECTION – II (IMMUNOLOGY)

(1) **IMMUNOLOGY** :
Introduction, definition of the terms : Immunity, antigen, antibody, immunogen, hapten, epitopes (antigenic determinants).

(2) **IMMUNITY** :
Introduction and classification of immunity. Innate immunity, Acquired immunity, Active and Passive immunity, Cell mediated immunity, Humoral immunity.

(3) **ANTIGEN** :
Introduction. Types – immunogens and haptens, haterophile and frossman antigen, antigenic determinants, immunogenicity.

(4) **ANTIBODY** :
Structure and diversity of antibody, monoclonal antibodies and their production. Polyclonal antibody antigen – antibody reactions and their applications.

(5) **COMPONENTS OF IMMUNOSYSTEM** :
Phagocytic cells, T cells and B Cells.

(6) **HYPERSENSITIVITY** :
Introduction and classification of hypersensitivity, immediate and delayed hypersensitivity, anaphylactic reactions, tests for hypersensitivity.

(7) **AUTOIMMUNITY** :
Basic concepts of autoimmunity.

(8) **VACCINES** :

Introduction, major vaccine production, potency testing and clinical importance. Distribution and storage of vaccine.

(9) **INVITRO SEROLOGICAL TESTS** :

(i) Immunological techniques : Radial immunodiffusion, Immunoelectrophoresis. Counterimmunoelectrophoresis.
(ii) Agglutination tests : Tube test, agglutination microscopic and macroscopic tests.
(iii) Precipitation tests : The ring test, Agar diffusion methods.
(iv) Complement Fixation tests : The Wasserman test.
(v) Other Serological Tests : Fluoroscent – antibody technique, Hemagglutination test, Immunochromatographic test and Lateral Flow through assays,
(vi) Introduction to Enzyme linked immunosorbent assay (ELISA), RIA, Dot immunoassay.
(vii) Diagnosis of HIV, HBV, HCV and other viral diseases.

REFERENCE BOOKS :

01. General Microbiology – Roger Y. Stainer, Edward A. Adelberg and John L. Ingrahm, 4th ed., Prentice Mall Inc.
02. Mackie and McCartney Medical Microbiology – A Guide to Laboratory Diagnosis and Control of infection, 13th ed., J.P.Duguid, B.P.Marmion

and R.H.A. Swain. The English Language Book Society and Churchill Company.
03. Fundamentals of Microbiology, Frobisher, Hinsdill, Crabtree and Goodheart, 9th Ed., W.B. Saunders Company.
04. Diagnostic Microbiology, Finegold and Matrin. 6th Ed., The C.V.Mosby co.
05. Bailley and Scott's Diagnostic Microbiology, Sydney m. Finegold and Ellen Jo Baron, 7th ed., The C.V.Mosby Co.
06. Microbiology, Pelczar, Ried Chah, 5th ed., Tata McGraw Hill Publishing Co. Ltd.
07. Practical Medical Microbiology, Collee Duguid, Fraser, Marmion, 24th Ed., Churchill Livingston.
08. Microbiology, Davis, Dulbecco. Eisen and Ginsborg, 3rd Ed., Harper International Edition.
09. Manual of Clinical Microbiology . Murry, Baron, Pfaller, Tenover, Yolken, 6th ed., American Society for Microbiology.
10. Text book of Microbiology. R. Ananthnarayan and C.K.Jayram Paniker, 5th Ed., Orient Longman.
11. Text book of Immunology, James T. Barrett, 5th Ed., The C.V.Mosby Co.
12. Essential Immunology, Irvan M. Roitt, 6th Ed., ELBS and Blackwell Scientific Publication.
13. Immunology. R.D.Guttmann, 1981, A Scope Publication.
14. Uses and Interpretation of Tests in Clinical Immunology. James B. Peter, 8th ed., Specially Laboratory Inc.
15. Immunology. Richard M.Hyde, 3rd Ed., (NMS), Indian edition, Williams and Willins, Baltimore, Maryland.
16. Modern Immunology, A.Dasgupte, 2nd ed., 1992, Jaypee Brothers Medical Publishers.
17. Immunology. Weir, 7th ed., ELBS. Churchill Livingstone, ELBS Students Edition.

REVISED SYLLABUS OF DIPLOMA IN MEDICAL TECHNOLOGY
(EFFECTIVE FROM JULY 2000)
PAPER – II CLINICAL PATHOLOGY & PARASITOLOGY

SECTION-I – CLINICAL PATHOLOGY

1. URINE ANALYSIS :
   (1) Physiology of urine formation
   (2) Composition of urine
   (3) Collection of urine
   (4) Routine examination Physical, Chemical and Microscopic
   (5) Correlation of urinary findings in various diseases.
   (6) Pregnancy Test
   (7) Analysis of urinary calculi.

2. STOOL ANALYSIS
   (1) Collection
   (2) Routine examination, physical, chemical & Microscopic
   (3) Correlation & significance in various disease.

3. CEREBROSPINAL FLUID :
   (1) Formation of C.S.F.
   (2) Collection & its technique
   (3) Normal composition.
   (4) Physical, Chemical & Microscopic examination India Ink Test & its significance.
   (5) Correlation of Abnormal C.S.F. findings in various diseases.

4. SPUTUM ANALYSIS
   (1) Anatomy & Physiology of Respiratory system
   (2) Collection of sputum
   (3) Physical, Microscopic and Bacteriological examination.
   (4) Detection of AFB by (a) Direct (b) Concentrated & (c) By Immunofluorescence Technique.

5. EXAMINATION OF BODY FLUID :
   (1) Collection of Pleural, Peritoneal & Pericardial fluids.
   (2) Physical, Chemical & Microscopic examination and its significance.
   (3) Transudate & Exudate
   (4) Collection, examination and significance of Synovial fluid.

6. SEMEN ANALYSIS :
   (1) Anatomy & Physiology of male reproductive system.
   (2) Formation of semen

(3) Collection
(4) Physical, Chemical & Microscopic examination
(5) Spermatozoa count
(6) Oligospermia, Azospermia & Abnormal forms of spermatozoa
(7) Medico-legal significance of semen examination.

7. GASTRIC ANALYSIS :
(1) Anatomy & Physiology of Stomach
(2) Significance & diagnostic importance of gastric secretions in various clinical conditions.

SECTION – II PARASITOLOGY

1. PROTOZOA :
Introduction. Classification and study of individual Protozoa.

(i) Entamoeba histolytica
(ii) Giardia lamblia
(iii) Leishmania donovani
(iv) Plasmodia & its different species. P.Vivax, P.falciparum, P.ovale, P.malaria.
(v) Toxoplasma gondii
(vi) Pneumocystis carinii

2. CESTODES :
Introduction. Classification and study of individual Cestodes.

(i) Diphyllobothrium latum
(ii) Taenia saginata
(iii) Taenia solium
(iv) Echinococcus granulosus

3. TREMATODES :
Introduction, classification & study of individual trematodes Schistosoma haematoblum, Schistosoma mansoni and Schitosoma japonicum

4. NEMATODES :
Introduction, classification and study of individual Nematodes.
(i) **Intestinal Nematodes** :
Ascaris lumbricoides, Ancylostoma duodenale, Necator Americans, Strongyloides stercoralis, Trichinella spiralis, Trichuris trichuria, Enterobius vermicularis.

(ii) **Somatic Nematodes :**
Wucheria bancrofti, Wucheria malayi, Dracunculus medinesis.

REFERENCE BOOKS :

01. Basic Histopathology, 2nd Ed., Wheater et. Al, ELBS, Churchil Livingstone, ELBS students Editions.
02. Text Book of Medical Laboratory Technology, P.B.Godkar, 1994, Bhalani Publishing House, Mumbai.
03. Medical Laboratory Technology, Vol. I & II, 1999. K.L. Mukherjee, Tata McGrawHill
04. Medical Laboratory Technology, Ramnik Sood, 4th ed., 1994 Jaypee Brothers.
05. A Handbook of Clinical Pathology, Chakraborthy & Bhattacharya & Bhattacharya, Academic Publisher.
06. Parasitology, K.D.Chatterjee, Chatterjee Medical Publishers.
07. Diagnostic Medical Parasitology, 2nd ed., L.S.Gracia & D.A.Bruckner, American Society of Microbiology.

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PAPER – III HAEMATOLOGY & BLOOD BANKING

SECTION-I – HAEMATOLOGY

1. INTRODUCTION :
   (a) Collection of Blood Samples for Haematological studies
   (b) Types of Anticoagulants
   (c) Capillary blood, venous blood & Storage of samples

2. SAEMATOLOGICAL TESTS :
   (a) Haemoglobin estimation
   (b) Red Blood Cell, White Blood Cell count.
   (c) Study of peripheral smear, differential WBC count, Morphology of Red Blood Cells
   (d) Absolute Eosinophil count.

3. ERYTHROCYTE SEDIMENTATION RATE :
   (a) Methods for measurement of ESR, Normal values, its significance
   (b) C-Reactive Protein
   (c) Osmotic fragility test
   (d) Haematocrit (PCV), Absolute Blood indices

4. PHYSIOLOGY OF BLOOD FORMATION :
   (a) Normal Erythropoiesis
   (b) Leucopoiesis
   (c) Formation & Functions of Blood Platelets

5. ANEMIAS :
   (a) Definition & Classification of anemias
   (b) Iron & B-12 deficiency anemias
   (c) Anemias of chronic disorders & Aplastic anemias
   (d) Haemolytic anemia / sideroblastic anemias
   (e) R.B.C. metabolism & G-6-PD deficiency anemias
   (f) Polycythemia

6. HAEMOGLOBINOPATHIES :
   (a) Structure of Haemoglobin molecule
   (b) Types of normal Haemoglobins
   (c) Abnormalities of Haemoglobin molecule
   (d) Sickle Cell anemia
   (e) Thalassemia, Alkali Denaturation Test & Electrophoresis

7. BONE-MARROW STUDY :
(a) Sites of Bone Marrow Collection, Technique & Indications
(b) Examination of Bone Marrow Slides
(c) Normal values & Reporting

8. LEUKEMIAS :
(a) Definition, Classification of Leukemias
(b) Acute & Chronic Myeloid Leukemias
(c) Cytochemical reaction

9. BLOOD COAGULATION :
(a) Mechanism of Blood Coagulation
(b) Bleeding time / Clotting time / Clot retraction
(c) Thrombin Time / Prothombin Time / Prothombin consumption test
(d) Coagulation disorders, Haemophilia A & Haemophilia B
(e) Platelet disorders

SECTION – II BLOOD BANKING

1. PRINCIPLES OF IMMUNOHAEMATOLOGY

2. BLOOD GROUP SYSTEM – 1 :
(a) ABO Blood Group system, subgroup of ABO, Variants in the ABO blood group system.
(b) Rh Blood Group system
(c) Serological techniques for detection of ABO and Rh antigens

3. COMPATIBILITY TESTING :
Compatibility testing and special methods of routine and emergency crossmatch, Trouble shooting in grouping and cross matching.

4. BLOOD GROUP SYSTEM – II :
Other blood group system, Importance of atypical antibodies, their detection and clinical significance.

5. HAEMOLYTIC DISEASE OF THE NEWBORN :
Haemolytic disease of the newborn due to ABO incompatibility, Rh incompatibility and other blood group incompatibility.

6. BLOOD COLLECTION
Screening of Donor, Blood collection, Storage and transportation of blood, Component preparation : Red cell concentrate, Washed red cells, FFP. Cryoprecipitate, Platelet concentration.

7. TRANSFUSION REACTION :

Types of transfusion reactions, Investigation of transfusion reaction.

8. Automation and biosafety in Blood Banking

9. Quality Control in Blood Banking.

REFERNECE BOOKS :

1. Haematology, 2nd ed., 1995, Hoffman, NMS Haematology US Edition
2. Immunohaematology, C.M.Zmijewski, Printece Hall of India.
3. Haematological Laboratory Methods, Edited by E. Merk
4. Clinical Haematology, M.M.Wintrobe, Rothari's Indian Edition.
5. Practical Haematology, J.A. Dacie & S.M.Lewis, The English Moody, Carman, Vellore.
6. Hand book of Medical Laboratory Technology, Bharucha, Mcyern Moody, Carman, Vellore.
7. Technical Manual, American Association of Blood Banks, 1996.
8. Quality Control in the Blood Bank, B.A.Myhre, American Society of Clinical Pathology.
9. Blood Bank Procedure Manual, Grady Memorial Hospital Lindu Hart, 1976.
10. Technical Methods & Procedures of the American Association of Blood Banks, 6th ed.

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PAPER – IV CLINICAL BIOCHEMISTRY

SECTION-I – INTRODUCTION

1. GENERAL LABORATORY TECHNIQUES :

Important properties of water, balances and weighing, units of measurements, characteristics and concentration of solution, dilution of solution. Law of mass action, isonisation in aqueous solution, H+ concentration and pH, Acid and Base, Buffers and Buffer action, Indicators. Osmosis and Osmotic pressure. Biochemistry Mathematics. Safety in the Clinical Laboratory.

2. QUALITY CONTROL :

Introduction, importance of Quality control. Accuracy, Precision and reliability; mean, distribution of data. Standard deviation. Preparation of Q.C. chart, normal range, coefficient of variation, purity of standards. Computer in clinical laboratory. Calibration of automated pipettes. Radiochemistry and its use in medicine, RIA.

3. ANALYTICAL PROCEDURE AND INSTRUMENTATION :

Photometry; Introduction, Principle of absorption of radiation. The Beer Law and its applications in clinical chemistry. Instrumentation – Principle, basic components and use in Biochemistry of the following :
pH Meter, Colorimeter, Spectrophotometer, Flame Photometer, Densitometer, Microtome, Autoanalyser, Gamma counter, Electrophoresis, Centrifuges and Ultracentrifuge.

SECTION – II BIOCHEMISTRY

4. BIOCHEMISTRY AND ROUTION BIOCHEMICAL TESTS :

(a) Carbohydrates :- Introduction, classification of carbohydrates, intermediate metabolism of blood glucose, determination of blood glucose and urine glucose, GTT, diabetes, hypoglycemia and hypoglycemia effect of hormones on blood glucose, insulin tolerance test and cortisone load test.

(b) Proteins :- Introduction, classification, functions of plasma protein, determination of protein, immunoglobulins and their classification, clinical significance of plasma proteins.

(c) Lipids and Lipoproteins :- Introduction, classification of lipids and lipoproteins, essential fatty acids. Determination of cholesterol, triglycerides and lipoprotein. Clinical significance of lipids and lipoproteins.

5. ELECTROLYTES AND BLOODGASES :

Introduction of electrolytes, determination of sodium, potassium, serum calcium, urinary calcium, phosphorus, chloride, iron and their clinical significance. Introduction of mechanism of respiration, blood gases, bicarbonate and pH Acidosis and Alkalosis. Determination of Serum / Plasma bicarbonate and their clinical significance.

6. BIOCHEMICAL TEST :

Liver function Tests, Ronal Function Tests, Pancreatic function tests and Cardiac function tests.

7. ENZYMES :-

Introduction of enzymes, as catalysts, nomenclature, classification, factors effecting the rate of enzyme reactions, Enzymes Kinetics, Enzyme assays in Clinical Biochemistry, Conventional methods and kinetic methods and their clinical significance for Phosphatases, Transaminases, Lactic dehydrogenesis, Creatine kinase, Amylase and Gama Glutamyl transferase.

8. HORMONES :-

Introduction to Thyroid and parathyroid hormones, Adrenal hormone, Pituitary hormones and sex hormones.

REFRENCE BOOKS :-

1. Outlines of Biochemistry, E.Conn, K.Stumpf, G.Brueneing & H.Dol, 5/E, John Weiley & Sons.
2. Practical Clinical Biochemistry, Horald Varley, 4/E, CBS publishers.
3. Clinical Chemistry – Interpretation & Techniques, 2nd ed., Kalpan & Lavarnei Szabo, Lea & Febiger Publication.
4. Medical Laboratory Technology, Vol. I, II & III, K.L. Mukherjea, 4th Reprint, McGraw Hill Publishing Company Ltd.
5. Medical Laboratory Technology – Methods and Interpretation. Sood, 4th ed., Jaypee Brother.
6. Text Book of Medical Laboratory Technology, 1994, P.Godkar, Bhalani Publishing House.
7. Notes on Clinical Laboratory Technology, K.M.Samuel, M.K.G. Iyyer Publishers.
8. Textbook of Medical Laboratory Technology, Chitra Bharucha, H. Mayer & R. H. Carman, C.M. College & Hospital, Vellore.
9. Fundamental of Biochemistry, A.C. Deb, New Central Book Agency.

10. Clinical Chemistry, 3rd ed, 1996, L.A.Kaplan & A.J.Pesce, The C.V.Mosbey Co.
11. Fundamental of Clinical Chemistry, 4th ed, edited by N.W.Tietz, W.B. Saunders Company.
12. Clinical Guide to Laboratory Tests, 3rd ed, 1995, Tietz.
13. "Tietz" Text Book of Clinical Chemistry, 2nd ed, 1994, Burtis, W.B. Sunders Company.
14. Basic Techniques in Clinical Laboratory Science, 3rd ed, 1992, Linne, Mosbey Publication.
15. Lynch's Medical Laboratory Technology, 4th ed., Raphael, Asian Edition, Saunders Company Publication.

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DIPLOMA IN MEDICAL TECHNOLOGY

(Effective from 2001-2002)
PRACTICALS BASED ON
PAPER – I

MICROBIOLOGY

1. Cleaning, Neutralization and preparation of glassware for sterilization.
2. Examination of Living Bacterias.
   a)Hanging drop technique
   b)Semisolid stab agar test
3. **[A] Staining of the bacterial cell :**
   a) The simple stain
   b) The Negative stain

   [B] Differential staining
   a) The Gram staining
   b) The Acid Fast staining

   [C] Special Staining
   a) The Spirocheate staining
   b) The Metachromatic staining
   c) The Spore staining
   d) The Capsule staining
   e) The Flagella staining
4. Study of some important biochemical reactions.
   a) Indole Test
   b) Methyl red Test
   c) V.P.Test
   d) Citrate Utilization Test
   e) Nitrate Reduction Test
   f) Fermentation of Sugers
   g) H2S Production (2% Peptone)
   h) Study of TSI slants with different bacteria
5. Preparation of Media, pH adjustment and preparation of buffers

[A] Bacteriological Media
   a) Neutrient agar
   b) MacConkey's agar
   c) EMB agar
   d) Wilson & Blair agar / Salmonella Shigella agar for Salmonella Sp.
   e) CLED Medium for Urinary Tract Infection
   f) King's Medium for Pseudomonas Sp.
   g) Mannitol salt agar for Staphylococcus sp.

[B] Mycological Media
   a) Potato-dextrose agar
   b) Glucose Yeast Extract agar
   c) Sabourads agar

6. Study of Enzymatic activity of bacteria
    a) Gelatinase
    b) Lipases
    c) Oxidase
    d) Catalase
    e) Phenylamine deaminase
    f) Dehydrogenase
    g) Decarboxylase
    h) Coagulase
    i) Urease
    j) Dehydratase
7. Isolation and identification of aerobic and anaerobic bacterial / pathogens from pathological specimens.
8. PURE CULTURE STUDY OF THE FOLLOWING CULTURES
    (i) Bacillus cereus
    (ii) Staphylococcus aureus
    (iii) Staphylococcus enteritidis
    (iv)Escherichia coli
    (v)Enterobacter aerogenes
    (vi)Klebsiella pneumonia
    (vii) Proteus vulgaris
    (viii) Salmonella typhi / paratyphi A / paratyphi B
    (ix) Shigella dysenteriae / shiga / sonnei / flexneri
    (x) Pseudomonas aeruginosa
9. Demonstration of common fungi: Penicillium, Aspergillus, Rhizopus, Mucor, Yeast.

IMMUNOLOGY

[A] Major diagnostic tests

1Widal tube agglutination test (Quantitative analysis)

1. Dot Immunoassay for tuberculosis
2. Dot Immunoassay for HIV
3. VDRL Quantitative test for Syphilis
4. Flow Through assay for HIV and HCV
5. Hepatitis surface antigen detection by ICT

[B] Minor diagnostic test

1. Latex test for Rheumatoid Arthritis
2. Latex test for pregnancy
3. Slide test (Trust) for syphilis
4. Slide test (RPR) for syphilis
5. VDRL Quantitative test for syphilis
6. Slide / strip / cassette / test for Hepatitis

7. Slide / strip / cassette / test for pregnancy
8. Widal slide agglutination test (qualitative)
9. Immunochromatography test for pregnancy
10. Mantoux test
11. C-Reactive Protein test
12. ASO test

REFERENCE BOOKS :

1. Medical Laboratory Technology, 5th reprint 1999, Vol. I, II, & III, K.L. Mukherjee, Tata McGraw Hill.
2. Text Book of Medical Laboratory Technology, P.B. Godkar, 1994, Bhalani publishing House, Mumbai.
3. Medical Laboratory Technology, Ramnik Sood, 4th ed, 1994 Jaipee Brother.
4. Hand Book of Medical Laboratory Technology, Bharucha, Meyerm, Mody, Carman.
5. Lynch's Medical Laboratory Technology, 3rd ed., Stanley S. Raphael, W.B.Saunders company, Asian edition.
6. Practical Medical Microbiology, Collee, Duguid, Fraser, Marmlon, 24th ed., Churchill Livingstone.
7. Laboratory Exercise in Microbiology, 2nd ed., Michael J.Pelczar, McGraw Hill Book Company.
8. A Hand Book of Practical Immunology, G.P.Talwar, Vikas Publishing House Pvt. Ltd.
9. Collection and Handling of Laboratory Specimens – A practical guide, 1983, Editor T.M. Slockbower and T.A. Bhumenfeld, J.B. Lippincott company, U.S.A.
10. Crown & Steel's Manual for the Identification of Medical Bacteria, 3rd Ed., Edited by G.I. Barrow and R.K.A. Felthan, Pub. Cambridge University Press.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

DIPLOMA IN MEDICAL TECHNOLOGY

PRACTICALS BASED ON PAPER – II

CLINICAL PATHOLOGY :

1. Urine Analysis – Physical, Chemical, Microscopic, and Microbiological examination.
2. Stool Analysis - Physical, Chemical, Microscopic, and Microbiological examination.
3. Cerebrospinal Fluid - Physical, Chemical, Microscopic, and Microbiological examination.
4. Sputum Examination – Physical and Microscopic &for A.F.B. by direct & concentrated technique.
5. Gastric analysis – Chemical examination of gastric juice.
6. Semen examination – Physical, Chemical and Microscopic.
7. Body fluids – Physical, Chemical and Microscopic examination.
8. Examination of skin scraping, sores and ulcers of skin – examination of bacteria, fungi and protozoal parasite.
9. Bacteriological examination of pus.
10. Bacteriological examination of Throat Swab.
11. Cutting, fixation, and processing of tissues.
    Staining – (i) Haematoxyline and eosin for paraffin sections
    (ii) PAP Stain for cytology

PARASITOLOGY

12. Laboratory study of parasites present in stool, urine, blood, and sputum.

REFERENCE BOOKS :

1. Medical Laboratory Technology, 5th reprint 1999, Vol.. I, II, & III, K.L.Mukherjee, Tata McGraw Hill.
2. Text Book of Medical Laboratory Technology, P.B. Godkar, 1994, Bhalani Publishing House, Mumbai.
3. Medical Laboratory Technology, Ramnik Sood, 4th ed., 1994, Jaipee Brother.
4. Hand Book of Medical Laboratory Technology, Bharucha, Meyerm, Mody, Carman.
5. Lynch's Medical Laboratory Technology, 3rd ed,. Stanley S. Raphael, W.B. Saunders Company Asian edition.
6. A Hand Book of Clinical Pathology, Chakroborthy & Bhattacharya, Academic Publishers.
7. Parasitology, K.D. Chaterjee, Chaterjee Medical Publishers.
8. Collection and Handling of Laboratory Specimens – A practical guide, 1983, Editor T.M. Slockbower and T.A. Bhumenfeld, J.B. Lippincott Company, USA.
9. Basic Laboratory Methods in Medical Parasitology, WHO,1991.

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PRACTICALS BASED ON PAPER – III

HAEMATOLOGY :

01. Methods of blood collection.
02. Haemoglobin estimation – Sahli's method and Cyanmethaemoglobin method.
03. Total R.B.C. and W.B.C. count.
04. Differntial count.
05. Packed cell volume / determination of haematocrit.
06. E.S.R.
07, Platelet count.
08. Bleeding Time, Whole Blood, Coagulation Time and Prothrombin Time.
09. Reticulocyte count.
10. Osmotic fragility test.
    11. Foetal haemogobin determination
    12. Sickling test
    13. Test for L. E. cells
    14. Cytochemical Tests- Peroxidase test, PAS stain Sudan Black B stain, Iron stain
    15. G6PD deficiency estimation
    16. Haemoglobin electrophoresis – Demonstration

BLOOD BANKING:

1. ABO Cell grouping and Serum grouping by slide and tube methods
2. Rh typing various techniques
3. Anti A/ Anti B titre
4. Anti D titration by albumin and indirect antiglobulin technique
5. Test for HBs Ag (Hepatitis B surface antigen) ELISA and Rapid Test)
6. Test for HIV antibodies (ELISA & Rapid test)
7. a. Cross matching procedures
   b. Direct antiglobulin (coomb's) test

REFERENCE BOOKS:-

1. Medical Laboratory Technology, 5th reprint1999, Vol.I, II and III , By K. L. Mukherjee , Tata Mcgraw Hill.
2. Text Book of Medical Laboratory Technology, P. B. Godkar, 1994, Bhalani Publishing House, Mumbai
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5. Lynch's Medical Laboratory Technology, 3rcd ed Stanley s Raphael, W. B. Saunders Company, Asian Edition
6. Practical Haematology, J. A. Dacie and S. M> Lewis, The English Language Book Society, 8th ed , ELBS
7. Collection and Handling of Laboratory Specimens- A practucak guide, 1983, Editor T. M. Slockbower and T. A. Bhumenfeld , J. B. Lippincott Company, USA

PRACTICALS BASED ON PAPER – IV

INSTURMENTATION:-

1. OPERATION OF PH meter, Colorimeter, Single pan balance, ad spectophotometer Demonstration of Flame photometer, Densitometer, Autoanalyser, Electrophoresis and Gamma counter.

CLINICAL BIOCHEMISTRY:-

1. Blood Glucose/ Sugar estimation and GTT
2. Blood /Urine Urea
3. Blood / urine Creatinine
4. Blood Uric acid
5. Blood Cholesterol- Free and Total
6. Blood Total Lipid
7. Blood Bilirubin
8. SGPT
9. SGOT
10. Serum Acid Phosphatase
11. Blood HDL Cholesterol
12. Serum Alkaline Phosphatase
13. Serum Amylase
14. Serum Tatal Protein and Serum Albumin and A/G ratio
15. Serum LDH, Serum Iron and TIBC (Total Iron Binding Capacity) and serum Chloride
16. Serum Triglycerides
17. Urea and Cretinine clearance test
18. Serum Electrolytes
19. Modern methods in Blood Analysis
20. Function test of Liver, Kidney and Cardiac
21. Serum Protein electrophoresis and Lipoprotein in electrophoresis Demonstration only

REFERENCE BOOKS

1. Medical Laboratory Technology, 5th reprint1999, Vol.I, II and III , By K. L. Mukherjee, Tata Mcgraw Hill.
2. Text Book of Medical Laboratory Technology, P. B. Godkar, 1994, Bhalani Publishing House, Mumbai
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6.. Collection and Handling of Laboratory Specimens- A practucak guide, 1983, Editor T. M. Slockbower and T. A. Bhumenfeld , J. B. Lippincott Company, USA

7. Practical Clinical Biochemistry, Harold Varley, 4th ed., CBS Publishers & Distributors.