



Re-Accredited by NAAC with 'A' Grade

VEER NARMAD SOUTH GUJARAT UNIVERSITY

University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.

વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી

યુનિવર્સિટી કેમ્પસ, ઉદ્ધના-મગદલા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.

Tel : +91 - 261 - 2227141 to 2227146, Toll Free : 1800 2333 011, Fax : +91 - 261 - 2227312
E-mail : info@vnsgu.ac.in, Website : www.vnsgu.ac.in

-: પરિપત્ર :-

વિજ્ઞાન વિદ્યાશાખા હેઠળની મેડીકલ ટેકનોલોજી વિષય ચલાવતી સંલગ્ન સ્નાતક કોલેજોના આચાર્યશ્રીઓને જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૧૯-૨૦ થી અમલમાં આવનાર ટી.વાય.બી.એસસી. સેમ.-૫ અને ૬નો મેડીકલ ટેકનોલોજીનો અભ્યાસક્રમ અંગે મેડીકલ ટેકનોલોજી વિષયની અભ્યાસસમિતિની તા.૨૬/૦૪/૨૦૧૯ની સભાનાં ઠરાવ ક્રમાંક: ૨ અન્વયે કરેલ નીચેની ભલામણ વિજ્ઞાન વિદ્યાશાખાની તા.૦૨/૦૫/૨૦૧૯ ની સભાનાં ઠરાવ ક્રમાંક : ૨૯ અન્વયે સ્વીકારી તે મંજૂર કરવા એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલએ તેની તા.૦૭/૦૬/૨૦૧૯ ની સભાના ઠરાવ ક્રમાંક: ૫૬ અન્વયે સ્વીકારી મંજૂર કરેલ છે. તેની જાણ સંબંધકર્તા શિક્ષકો અને વિદ્યાર્થીઓને કરવી, તદ્દુપરાંત તેનો અમલ કરવો.

મેડીકલ ટેકનોલોજી વિષયની અભ્યાસસમિતિની તા.૨૬/૦૪/૨૦૧૯ ની સભાનાં ઠરાવ ક્રમાંક: ૨

:: આથી ઠરાવવામાં આવે છે કે, પેટાસમિતિએ તૈયાર કરેલ ટી.વાય.બી.એસસી. સેમ.-૫ અને ૬નો મેડીકલ ટેકનોલોજીનો શૈક્ષણિક વર્ષ ૨૦૧૯-૨૦ થી અમલમાં આવનાર અભ્યાસક્રમ સુધારા વધારા સાથે સ્વીકારી તે મંજૂર કરવા વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

વિજ્ઞાન વિદ્યાશાખાની તા.૦૨/૦૫/૨૦૧૯ ની સભાનાં ઠરાવ ક્રમાંક: ૨૯

:: આથી ઠરાવવામાં આવે છે કે, પેટાસમિતિએ તૈયાર કરેલ ટી.વાય.બી.એસસી. સેમ.-૫ અને ૬નો મેડીકલ ટેકનોલોજીનો શૈક્ષણિક વર્ષ ૨૦૧૯-૨૦ થી અમલમાં આવનાર અભ્યાસક્રમ સુધારા વધારા સાથે સ્વીકારી તે મંજૂર કરવા એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

એકેડેમિક કાઉન્સિલની તા.૦૭/૦૬/૨૦૧૯ ની સભાનાં ઠરાવ ક્રમાંક: ૫૬

:: આથી ઠરાવવામાં આવે છે કે, વિજ્ઞાન વિદ્યાશાખાએ તેની તા. ૦૨/૦૫/૨૦૧૯ ની સભાના ઠરાવ ક્રમાંક : ૨૯ અન્વયે ભલામણ કરેલ શૈક્ષણિક વર્ષ ૨૦૧૯-૨૦ થી અમલમાં આવનાર ટી.વાય.બી.એસસી. સેમ.-૫ અને ૬નો મેડીકલ ટેકનોલોજીનો અભ્યાસક્રમ સ્વીકારી મંજૂર કરવામાં આવે છે.

ખિડાણ: ઉપર મુજબ

ક્રમાંક : એકે./પરિપત્ર/૧૦૩૮૫/૧૯

તા. ૨૧-૦૬-૨૦૧૯

ઈ.યા. કુલસચિવ

પ્રતિ,

- ૧) વિજ્ઞાન વિદ્યાશાખા હેઠળની મેડીકલ ટેકનોલોજી વિષય ચલાવતી સ્નાતક કોલેજોના આચાર્યશ્રીઓ.
- ૨) અધ્યક્ષશ્રી, વિજ્ઞાન વિદ્યાશાખા
- ૩) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.

...તરફ જાણ તેમજ અમલ સારું.

૧૦૨૫૩૫૩૧૧૩

VEER NARMAD SOUTH GUJARAT
UNIVERSITY,

Surat-7

Syllabus

of

T. Y. B. Sc. Medical Technology

(As per CBCS)

Effective From June 2019

COURSE- MT: 11	BACTERIOLOGY AND VIROLOGY	CREDIT- 02	2hrs/week
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Unit 1 Human-microbe interactions

- 1.1 Normal Flora of Human Body
- 1.2 Patterns of infectious disease in a population
- 1.3 Establishment of Infectious disease
- 1.4 Epidemiology and Epidemiological methods
- 1.5 Nosocomial infections: Source, Surveillance, Prevention, Control
- 1.6 Emerging and Reemerging infectious disease and pathogens
- 1.7 Antibiotic sensitivity tests

Unit 2 Bacterial Disease I: Causative Agents, Pathogenesis, Laboratory diagnosis and Prophylactic measures

- 2.1 Gas Gangrene
- 2.2 Tetanus
- 2.3 Plague
- 2.4 Leptospirosis
- 2.5 Diphtheria
- 2.6 Pertusis
- 2.7 Tuberculosis
- 2.8 Pneumonia

Unit 3 Bacterial Diseases II: Causative Agents, Pathogenesis, Laboratory diagnosis and Prophylactic measures

- 3.1 Syphilis
- 3.2 Gonorrhea
- 3.3 Urinary Tract Disease
- 3.4 Bacterial Food Poisoning
- 3.5 Enteric Fever
- 3.6 Cholera
- 3.7 Helicobacter infection

Unit 4 Viral Diseases : Causative Agents, Pathogenesis, Laboratory diagnosis and Prophylactic measures

- 4.1 Mumps, Measles, Rubella
- 4.2 Rabies

- 4.3 Polio-myelitis
- 4.4 AIDS
- 4.5 Hepatitis
- 4.6 Influenza
- 4.7 Dengue
- 4.8 Chikungunya

References:

- Greenwood, D., Slack, R., Peutherer, J. 1998, *Medical Microbiology; A guide to Microbial Infections: Pathogenesis, Immunity, Laboratory Diagnosis and Control*, 15th Ed., ELST with Churchill Livingstone.
- Willey, J. M., Sherwood, L. M. and Woolverton, C. J. 2014, *Prescott, Harley, and Klein's Microbiology; 9th ed.* , McGraw Hill Education.
- Ananthanarayan and Paniker. 2013, *A Textbook of Microbiology, 9th ed.* ,Universities Press. (Arti Kapil – Editor)
- Eugene W. Nester, 2001. *Microbiology: A human perspective 3rd ed.*, McGraw Hill New York.

Additional References:

- Collee, J.G., Fraser, A.G., Marmion, B.P. and Simmins, A. 1996, Mackie & McCartney *Practical Medical Microbiology*, 14 ed. Churchill Livingstone
- Pelczar, Chan, R., *Microbiology*, 4th ed., Tata McGraw Hill Publishing Co. Ltd.
- Murray, Baron, Pfaller, Tenover, Tenover, Tenover, Yolken, *Manual of Clinical Microbiology*, 6th ed. ., American Society for Microbiology.
- Konemam E. W, *Color Atlas and Textbook of Diagnostic Microbiology*, 5thed., Lippincott.
- *Prescott*

COURSE- MT: 12	CLINICAL PATHOLOGY	CREDIT- 02	2hrs/week
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Unit 1 Urine and Gastric Juice Analysis

- 1.1 Composition, Collection & Preservation of Urine
- 1.2 Routine Urine Analysis – Physical, Chemical and Microscopic
- 1.3 Automated Urine Analysis & Reagent Strip Method
- 1.4 Pregnancy Test
- 1.5 Collection, Composition and routine analysis of Gastric Juice

Unit 2 Examination of Faeces and Sputum

- 2.1 Collection, Preservation of Specimen
- 2.2 Indication of Stool analysis
- 2.3 Routine Physical, Chemical & microscopic examination of Faeces
- 2.4 Concentration Techniques:
 - 2.4.1 Sedimentation Techniques
 - 2.4.2 Floatation Techniques
 - a) Simple Floatation Technique
 - b) Lane's Direct Centrifugal Floatation technique
 - c) Zinc Sulphate Centrifugal Floatation technique
- 2.5 Collection and routine analysis of Sputum

Unit 3 Semen Analysis

- 3.1 Collection of Semen
- 3.2 Indications of Semen Analysis
- 3.3 Routine Physical, Chemical and Microscopic Examination
- 3.4 Automated Semen Analysis

Unit 4 Body Fluids and Sputum Analysis: Collection, Composition, Physical, Chemical and Microscopic examination and their Clinical Significance

- 4.1 Cerebrospinal Fluid
- 4.2 Synovial Fluid
- 4.3 Pleural Fluid
- 4.4 Peritoneal (Ascitic) Fluid
- 4.5 Pericardial Fluid

References:

- Chatterjee K.D. (2009). *Parastology: Protozoology and Helthminthology in Relation to Clinical Medicine*, 13th ed., CBC Publishers & Distributors Pvt Ltd
- John Bernard Henry. 2011, *Clinical Diagnosis and Management by Lab. Methods*, 22nd ed., W.B. Saunders Co.
- P.B. Godkar, 2014, *Textbook of Medical Laboratory Technology*, 3rd ed., Bhalani Publishing House, Mumbai, India.

COURSE- MT: 13	CLINICAL BIOCHEMISTRY AND ENZYMOLGY	CREDIT- 02	2hrs/week
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Unit 1 Blood Sugar

- 1.1 Regulation of blood glucose
- 1.2 Blood Sugar level and its significance
- 1.3 Glycosuria and its types
- 1.4 Diabetes mellitus: Stages, clinical types, causes and metabolic changes
- 1.5 GTT, Glycosylated Haemoglobin and its determination

Unit 2 Plasma Lipids and Lipoproteins

- 2.1 Plasma lipids and its separation methods
- 2.2 Factors influencing cholesterol level in blood
- 2.3 Pathological variations of serum cholesterol
- 2.4 Lipoproteins: Introduction, Classification and Metabolism
- 2.5 Clinical disorder of lipoprotein metabolism
- 2.6 Artherosclerosis

Unit 3 Plasma Proteins

- 3.1 Separation of Plasma Proteins
- 3.2 Bence- Jones' Proteins
- 3.3 Function of plasma proteins
- 3.4 Clinical significance of Total Protein, Albumin, Globulin and A:G ratio
- 3.5 Electrophoretic pattern of protein fractions in health and disease

Unit 4 Clinical Enzymology

- 4.1 Functional and non-functional enzymes
- 4.2 Serum Enzymes in Heart Diseases, Liver Diseases and Malignancies
- 4.3 Clinical Importance of Isoenzymes: LDH, CK, ALP
- 4.4 Enzymes as diagnostic reagents

References:

- Chatterjea M. N. and Shinde R. 2007. *Textbook of Medical Biochemistry*, 8th ed., Jaypee Brothers Publishers.

- P.B. Godkar, 2014, *Textbook of Medical Laboratory Technology*, 3rd ed., Bhalani Publishing House, Mumbai, India.
- Vasudevan D. & Sreekumari S. 2005. *Textbook of Biochemistry*; 4th ed, Jaypee Publishers.

Additional References:

Harold Varley, 1990, *Practical Clinical Biochemistry* ,Indian Edition, Anold Heinemann.

N.W. Tietz , *Fundamental of Clinical Chemistry*, 4ed. W.B. Saunders Co.

Clinical Chemistry, 3e, Kaplan & Psce, The C.V. Mosbey Co.

K.L.Mukherjee, 1997, *Medical Laboratory Technology*, Vol.I,II & III, Tata McGrawHill.

Keith Wilson & John Walker, *Practical Biochemistry: Principles & Technique*, 5ed, Cambridge University Press.

Tietz, *Textbook of Clinical Chemistry*, 3e, Bartis & Ashwood, W.B. Saunders Co.

COURSE- MT: 14	HAEMATOLOGY	CREDIT- 02	2hrs/week
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Unit 1 Introduction to Haematology

- 1.1 Introduction, Collection, Processing, Storage, preservation and function of blood
- 1.2 Stages of development in : Erythropoiesis, Leucopoiesis and Thrombopoiesis
- 1.3 Morphology, functions and abnormalities of RBC, WBC and platelets
- 1.4 Haemoglobin: Structure, Types of normal and abnormal Haemoglobins
- 1.5 Haemoglobins Derivatives and variants

Unit 2 Routine Haematological tests

- 2.1 Estimation of Haemoglobin:
 - a) Sahli's Method
 - b) Cyanmethhaemoglobin Method
 - c) Specific gravity method
- 2.2 Total Blood cell count: RBC, WBC and Platelet count
- 2.3 Differential Leucocyte count
- 2.4 Determination of Haematocrit and RBC Indices
- 2.5 Determination of ESR by Westergren Method

Unit 3 Special Haematological tests

- 3.1 Screening for Sick cell Anaemia: Slide, Tube & NESTROF Test
- 3.2 Determination of Fetal Haemoglobin
- 3.3 Determination of Osmotic Fragility of RBC
- 3.4 Detection of G₆PD Deficiency
- 3.5 Haemoglobin Electrophoresis and Electrophoretic pattern of Normal Haemoglobin, Sick cell Anaemia and Thalassemia
- 3.6 Morphological Classification of Anaemia and Leukemia
- 3.7 Reticulocyte count and Absolute Eosinophil Count

Unit 4 Test for coagulation functions

- 4.1 Mechanism of Blood Coagulation and Coagulation Cascade
- 4.2 Test for Coagulations functions: Bleeding Time, Clotting Time, Clot retraction and Lysis time
- 4.3 Determination of Prothrombin time
- 4.4 Determination of Activated Partial Prothrombin Time
- 4.5 Determination of Fibrinogen
- 4.6 Determination of Plasma Recalcification

References:

- P.B. Godkar, 2014, *Textbook of Medical Laboratory Technology*, 3rd ed., Bhalani Publishing House, Mumbai, India.
- Ochei J. & Kolhatkar A. 2000, *Medical Laboratory Science: Theory & Practice*, Tata McGraw Hill Pub.
- John Bernard Henry. 2011, *Clinical Diagnosis and Management by Lab. Methods*, 22nd ed., W.B. Saunders Co.

Additional References:

- Bharucha, Meyerm Moody, Carman, Vellore., *Hand Book of Medical Laboratory Technology*
- A. Dacie & S. M. Lewis ,*Practical Haematology*, The English Language book Society, 8 ed, ELBS.
- Hoffman , 1995, *Haematology*, 2nd ed, NMS Hematology US Edition
- M.M. Wintrobe, *Clinical Haematology*, Kothari's Indian Edition

COURSE- MT: 15	CLINICAL LABORATORY INSTRUMENTATION	CREDIT- 02	2hrs/week
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Unit 1 Photometric instruments

- 1.1 Introduction : Beers – Lamberts law
- 1.2 Colorimeter : Principle, Types, Basic components and Operation and uses
- 1.3 Spectrophotometer : Types, Principle, basic components and their functions, operation, uses,
- 1.4 Flame Photometer : Principle, Types, Components and Use
- 1.5 Flourimeter : Principle, Types, Components and Use
- 1.6 Turbidometer

Unit 2 Chromatography

- 2.1 Introduction and Types
- 2.2 Paper Chromatography and Thin Layer Chromatography
- 2.3 Ion Exchange Chromatography
- 2.4 HPTLC
- 2.5 Affinity Chromatography
- 2.6 Gel Filtration Chromatography

Unit 3 Electrophoresis

- 3.1 Introduction, Principle and components of Electrophoresis
- 3.2 Supporting medium : Agarose gel, polyacrylamide
- 3.3 Electrophoretic techniques: SDS PAGE, Native PAGE, 2 D Gel electrophoresis, IEF, Gradient gel and Agarose gel Electrophoresis.

Unit 4 Radiochemical Techniques

- 4.1 Types of radiation emission and Radioactive substances
- 4.2 Gamma counter
- 4.3 Types of Scintillation counter
- 4.4 Biochemical application of radioisotopes

References:

- P. Ashokan , *Analytical Biochemistry : (Biochemical Technique)*, Chinnaa Pub., Nelvisharani, Vellor.
- Wilson and Walker, 2005, *Principles and Techniques of Biochemistry and Molecular Biology*, 6th ed., Cambridge University Press.

COURSE- MT: 16	LABORATORY MANAGEMENT	CREDIT- 02	2hrs/week
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Unit 1 Organization and Management of Clinical Laboratory

- 1.1 Laboratory Facilities and Organization
 - 1.1.1 Functional Consideration in Lab Design
 - 1.1.2 Spatial Consideration in Lab Design
 - 1.1.3 Specific Consideration in Lab Design
- 1.2 Stages in Laboratory design and building
- 1.3 Purchasing
- 1.4 Personnel management

Unit 2 Fiscal and Information Management

- 2.1 Factors influencing fiscal decisions
- 2.2 Cost Finding
- 2.3 Budgeting
- 2.4 Communication
- 2.5 Requisitioning and Reporting
- 2.6 Use of Computers in Clinical Laboratory

Unit 3 Total Quality Management

- 3.1 Quality Laboratory Processes
- 3.2 Quality Assurance
- 3.3 Quality Assessment
- 3.4 Quality Control and various ways of maintaining QC
- 3.5 Formulating Quality control charts: LJ chart and Cusum Chart
- 3.6 Importance of reference range
- 3.7 Westguard multirule charts

Unit 4 Accreditation of Medical Laboratory: NABL

- 4.1 Introduction and scope
- 4.2 Aims and objectives
- 4.3 Description and types of laboratory
- 4.4 Qualification norms
- 4.5 General technical requirements

References:

- P.B. Godkar, 2014, *Textbook of Medical Laboratory Technology*, 3rd ed., Bhalani Publishing House, Mumbai, India.
- John Bernard Henry. 2011, *Clinical Diagnosis and Management by Lab. Methods*, 17th ed., W.B. Saunders Co.
- <https://www.nabl-india.org>>2019/02

Additional References:

- K.L. Mukherjee, *Medical laboratory Technology*, Vol.I,II & III, Tata McaGraw Hill, Latest Edition.
- Burtis, C. A and Ashwood E. R., 1999, *Tietz Textbook of Clinical Chemistry*, 3rd ed., W.B Saunders Company.

Medical Technology Practicals

SEMESTER – 5

1. Collection, handling and transport of clinical specimens for bacteriological analysis
2. Diagnostic problems in Bacterial Desiases
3. Antimicrobial susceptibility test and determination of MIC
4. Urine analysis – Physical, Chemical, Microscopic
5. Chemical Examination of urine by Reagent strip method
6. Stool analysis - Physical, Chemical, Microscopic, Microbiologic & Concentration Technique
7. CSF analysis – Physical, Chemical, Microscopic
8. Sputum analysis – Physical & Microscopic
9. Semen analysis – Physical, Chemical, Microscopic
10. Body fluid – Pleural, Peritoneal, Pericardial & Synovial – Physical, Chemical, Microscopic
11. Estimation of blood sugar
12. Glucose Tolerance Test.
13. Serum Total Proteins and Albumin
13. Serum Urea and Blood Urea Nitrogen (BUN)
14. Serum Creatinine
15. Serum Uric acid
16. Serum Cholesterol and HDL Cholesterol, Triacylglyceride (TG) and Lipoproteins
17. Serum Iron and TIBC (Total Iron Binding Capacity)
18. Serum Total Bilirubin and Direct bilirubin
19. Serum Enzymes: Alanine transaminase, Aspartate transaminase, Alkaline Phosphatase, Acid Phosphatase, Amylase
20. Haemoglobin estimation by Sahli's and by Cyanmethaemoglobin method
21. Complete blood cell count
22. Peripheral smear study
23. E.S.R. and packed cell volume
24. Sickling test
25. Reticulocyte count
26. Absolute eosinophil count
36. G₆PD deficiency test
37. Test for bleeding and clotting time (Demonstration)
38. Test for Prothrombin Time (Demonstration)
39. Test for determination of Activated Partial Thromboplastin Time

References :

- Ranjan Chawla, Practical Clinical Biochemistry: Methods and Interpretation, 2e, Jaypee Brothers.
- Chitra Bharucha, Carmann, Mody 1987, Handbook of Medical Laboratory Technology, A.H. Press, Vellore.
- Dacie & Lewis, Practical Haematology, 8e The English Language Book Society, o ELBS
- Chakraborty & Bhattacharya, Handbook of Clinical Pathology, Academic Publisher.
- WHO, 1991 , Basic Laboratory Methods in Medical Parasitology.
- Dacie & S.M. Lewis , Practical Haematology, J. A., The English Language Book Society, 8th ed., ELBS.
- Ramphael , Lynch's Medical laboratory Technology, 3e, W.B. Saunders Co.
- J Ochei & A. Kolhatkar, Medical Laboratory Science: Theory & Practice, Tata McGraw Hill Pub.

SEMESTER - 6

MT - 17 Parasitology and Mycology

COURSE- MT: 17	Parasitology and Mycology	CREDIT- 02	2hrs/week
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Unit - 1 Mycological diseases: Causative agent, Clinical features and Laboratory diagnosis

- 1.1 Superficial Mycosis
- 1.2 Cutaneous Mycosis: Dermatophytosis
- 1.3 Subcutaneous Mycosis: Mycetoma, Chromomycosis & Rhinosporidiosis
- 1.4 Systemic Mycosis: Blastomycosis & Histoplasmosis
- 1.5 Opportunistic Mycosis: Aspergillosis, Penicillosis, Candidosis & Zygomycosis
- 1.6 Specimen collection and microscopic examination

Unit - 2 Protozoology: Morphology, Life cycle and Laboratory diagnosis

- 2.1 Terminologies: Parasite, Host, Symbiosis, Comensalism, Parasitism, Protozoa & Helminths
- 2.2 Class of parasites & Hosts
- 2.3 *Entamoeba histolytica*
- 2.4 *Giardia lamblia*
- 2.5 Opportunistic Protozoa: *Naegleria fowleri* & *Acanthamoeba* species
- 2.6 *Leishmania donovani*
- 2.7 *Plasmodium falciparum* & *Plasmodium vivax*
- 2.8 *Toxoplasma gondii*

Unit - 3 Helminthology - 1: Morphology, Life cycle and Laboratory diagnosis

- 3.1 Cestodes
 - 3.1.1 *Taenia saginata*
 - 3.1.2 *Taenia solium*
 - 3.1.3 *Echinococcus granulosus*
- 3.2 Trematodes
 - 3.2.1 *Schistosoma haematobium*
 - 3.2.2 *Schistosoma mansoni*
 - 3.2.3 *Schistosoma japonicum*

Unit - 4 Helminthology – 2 (Nematodes): Morphology, Life cycle and Laboratory diagnosis

- 4.1 *Trichuris trichiura*
- 4.2 *Strongiloides stercoralis*
- 4.3 *Anchylostoma duodenale*
- 4.4 *Enterobius vermicularis*
- 4.5 *Ascaris lumbricoides*
- 4.6 *Wuchereria bancrofti*

4.7 *Dracanculus medinensis*

References :

- 1) Ananthanarayan & Paniker's *Textbook of Microbiology*, (2013). 9th ed., Universities Press.
- 2) Chatterjee K.D. (2009). *Parastology: Protozoology and Helthminthology in Relation to Clinical Medicine*, 13th ed., CBC Publishers & Distributors Pvt Ltd
- 3) Arora D.R. and Arora B. (2004). *Medical Parasitology*, 2nd ed., CBC Publishers & Distributors Pvt Ltd.
- 4) Godkar P. B. (2014). *Textbook of Medical Laboratory Technology*, 3rd ed., Bhalani Publishing house.

Additional References:

- 1) Greenwood D., Slack R. C. B., Peutherer J. F. (2002). *Medical Microbiology; A guide to Microbial Infections: Pathogenesis, Immunity, Laboratory Diagnosis and Control*, 16th ed., ELST with Churchill Livingstone.
- 2) Konemam E. W, *Color Atlas and Textbook of Diagnostic Microbiology*, 5th ed., Lippincott
- 3) Murray, Baron, Pfaller, Tenover, Tenover, Yolken, *Manual of Clinical Microbiology*, 6th ed., American Society for Microbiology.

MT – 18 Immunology

COURSE- MT: 18	Immunology	CREDIT- 02	2hrs/week
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Unit - 1 Innate Immunity

- 1.1 Introduction
- 1.2 Physical and mechanical barrier
- 1.3 Chemical mediators
- 1.4 Cells & organs of Immune system
- 1.5 Phagocytosis
- 1.6 Inflammation

Unit - 2 Adaptive Immunity

- 2.1 Antigen, Hapten & Adjuvant
- 2.2 Immunoglobulin: Structure & Types
- 2.3 Types of Acquired immunity: Active & Passive
- 2.4 T cell & B cell biology
- 2.5 Monoclonal antibody production & its use
- 2.6 Clonal selection theory
- 2.7 Vaccination schedule in India

Unit - 3 Antigen - Antibody reaction

- 3.1 General factors of antigen – antibody reactions
- 3.2 Precipitation reaction
- 3.3 Agglutination reaction
- 3.4 EIA
- 3.5 ELISA
- 3.6 CLIA

Unit - 4 Immunological disorders

- 4.1 Hypersensitivity reactions
 - 4.1.1 Classification of Hypersensitivity
 - 4.1.2 Anaphylaxis
 - 4.1.3 Cytolytic and cytotoxic
 - 4.1.4 Immune complex diseases
 - 4.1.5 Delayed Hypersensitivity
- 4.2 Mechanism of autoimmunization and Auto Immune Hemolytic Anemia
- 4.3 Immunodeficiency disorder

References :

- 1) Willey J. M., Sherwood L. M. and Woolverton C. J. (2014). *Prescott's Microbiology*, 9th ed., Mc Graw Hill Education.
- 2) Ananthanarayan & Paniker's *Textbook of Microbiology*, (2013). 9th ed., Universities Press.

Additional references:

- 1) Kindt T. J., Goldsby R. A. and Oarbara B. A. (2007). *Kuby Immunology*, 6th ed., W. h. Freeman and Company, New York.
- 2) Dasgupta A. (2007). *Immunology*, 1st ed., Jaypee
- 3) Tizard I. R. (1995). *Immunology*, 4th ed., Thomson.

MT - 19 Histology & Cytology

COURSE- MT: 19	Histology & Cytology	CREDIT- 02	2hrs/week
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Unit – 1 Introduction to Histopathology

- 1.1 General outline of procedure of tissue examination
- 1.2 Types of specimen preparation
- 1.3 Fixation : Types, Advantages & Disadvantages

1.4 Decalcification

Unit – 2 Tissue Processing

- 2.1 Introduction
- 2.2 Selection of tissue blocks for sectioning
- 2.3 Dehydration
- 2.4 Clearing
- 2.5 Wax Impregnation
- 2.6 Embedding
- 2.7 Automatic tissue processing

Unit – 3 Section Cutting & Staining

- 3.1 Types of Microtomes
- 3.2 Microtome knives
- 3.3 Sharpening of microtome knives
- 3.4 Frozen sections
- 3.5 Principle & procedure of H & E staining

Unit – 4 Diagnostic Cytopathology

- 4.1 Introduction
- 4.2 Role and Branches of Diagnostic Cytology
- 4.3 Techniques for Exfoliative cytology
- 4.4 Interventional cytology
 - 4.4.1 FNAC
 - 4.4.2 Imprint cytology
 - 4.4.3 Crush smear cytology
 - 4.4.4 Biopsy cytology

References:

- 1) Godkar P. B. (2014). *Textbook of Medical Laboratory Technology*, 3rd ed., Bhalani Publishing house.
- 2) Mohan H. (2005). *Textbook of Pathology*, 5th ed., Jaypee Brothers Medical publishers (P) LTD.
- 3) Ochei J. and Kolhatkar A. (2000). *Medical Laboratory Science: Theory and Practice*, Mc Graw Hill Education (India) Private Limited, New Delhi.

MT - 20 Pathophysiology

COURSE- MT: 20	Pathophysiology	CREDIT- 02	2hrs/week
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Unit – 1 Renal Function Tests

- 1.1 Introduction : Functions of Kidney & Classification of RFT
- 1.2 Tests based on Glomerular filtration
- 1.3 Tests to measure Renal plasma flow
- 1.4 Tests based on Tubular function

Unit – 2 Liver Function Tests

- 2.1 Introduction : Functions of Liver & Classification of LFT
- 2.2 Tests based on Abnormalities of Metabolism : Bile pigment, Carbohydrates & Drug
- 2.3 Tests based on changes in Plasma Proteins & Lipids
- 2.4 Tests based on Detoxification function & Excretory function
- 2.5 Tests for Amino acid catabolism & Formation of Prothrombin
- 2.6 Serum enzymes in liver diseases

Unit – 3 Cardiac Function Tests & Thyroid Function Tests

- 3.1 List of Cardiac profile test
- 3.2 Cardiac injury panel test
- 3.3 Cardiac markers
- 3.4 Cardiac enzymes
- 3.5 Introduction and classification of Thyroid function test
- 3.6 Tests based on primary function of thyroid
- 3.7 Tests for measurement of thyroid hormone
- 3.8 Tests based on metabolic effect of thyroid hormone

Unit – 4 Acid – Base Balance & Imbalance

- 4.1 Introduction
- 4.2 Acid – Base balance in normal health
- 4.3 Mechanism of regulation of pH
 - 4.3.1 Role of different buffer system
 - 4.3.2 Role of Respiration
 - 4.3.3 Role of Kidney
- 4.4 Acid – Base imbalances: Acidosis & Alkalosis

References :

- 1) Chatterjaj M. N. and Shinde R. (2012). *Textbook of Medical Biochemistry*, 8th ed., Jaypee Brothers Publishers.
- 2) Godkar P. B. (2014). *Textbook of Medical Laboratory Technology*, 3rd ed., Bhalani Publishing house.

Additional References:

- 1) Burtis C. A. and Ashwood E. R. (1998). *Tietz Textbook of Clinical Chemistry*. 3rd ed., Harcourt Brace & Company ASIA PTE LTD.
- 2) Alex Kaplan, Lavernfl Szabo, Lee & Febiger *Clinical Chemistry Interpretation and Results*.

MT - 21 Blood Banking

COURSE- MT: 21	Blood Banking	CREDIT- 02	2hrs/week
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Unit – 1 Blood Group System

- 1.1 ABO blood group system & its detection methods
- 1.2 Rh blood group system & its detection methods
- 1.3 Bombay blood group system & its detection methods
- 1.4 Other blood group system

Unit – 2 Blood Donation

- 2.1 Donors selection & rejection criteria
- 2.2 Anticoagulants
- 2.3 Tapping of Donor
- 2.4 Reaction during & after donation
- 2.5 Pre-transfusion tests
- 2.6 Types of Blood transfusion : Allogenic, Directed & Autologous

Unit – 3 Compatibility Testing & Transfusion Reactions

- 3.1 Compatibility testing
 - 3.1.1 Major & Minor cross matching
 - 3.1.2 Emergency cross matching
 - 3.1.3 Automation group matching
- 3.2 Mechanism & Investigation of Hemolytic disease of New born
- 3.3 Transfusion reaction
 - 3.3.1 Types of transfusion reaction

3.3.2 Investigation of suspected transfusion reaction

Unit – 4 Blood Components: Preparation, Storage & Use

- 4.1 Red cell concentrate
- 4.2 Platelet concentration
- 4.3 Leucocyte concentrate
- 4.4 Fresh frozen plasma
- 4.5 Factor VIII concentrate & Factor IX concentrate
- 4.6 Basic concepts of : Hemapheresis, Plasmapheresis, Cytapheresis, Plateletpheresis, Leukapheresis

References:

- 1) Ochei J. and Kolhatkar A. (2000). *Medical Laboratory Science: Theory and Practice*, Mc Graw Hill Education (India) Private Limited, New Delhi.
- 2) John Bernard Henry, Todd, Sanford and Davidsohn, (2003). *Clinical Diagnosis and Management by Laboratory Methods*, 17th ed., All India Traveller Book Seller.
- 3) Makroo R. N. and Mitra J. *Compendium Transfusion Medicine*.
- 4) Bryant N. J., A. R. T, F. A. C. B. S, (1994). *An introduction to Immunohematology*, 3rd ed., W. B. Saunders Company.

Additional references:

- 1) Godkar P. B. (2014). *Textbook of Medical Laboratory Technology*, 3rd ed., Bhalani Publishing house.
- 2) Bharucha, Meyerm Moody, Carman, Vellore., *Hand Book of Medical Laboratory Technology*

MT - 22 Recent Advances in Diagnostic techniques

COURSE- MT: 22	Recent Advances in Diagnostic techniques	CREDIT- 02	2hrs/week
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Unit - 1 Nucleic acid based methods

- 1.1 Polymerase chain reaction & its types
- 1.2 Southern Blotting technique

- 1.3 Northern Blotting technique
- 1.4 RFLP
- 1.5 Genotyping method

Unit - 2 Modern Pathology

- 2.1 Computer Assisted Imaging
- 2.2 FISH
- 2.3 Microarray
- 2.4 Karyotype analysis

Unit - 3 Immunological assay

- 3.1 RIA
- 3.2 ELISA & Enzyme multiplied immunoassay technique
- 3.3 Fluoroimmunoassay
- 3.4 Flow cytometry
- 3.5 Immunolotting

Unit - 4 Automation

- 4.1 Introduction
- 4.2 Automation in Biochemistry Laboratory
- 4.3 Automation in Haematology Laboratory (Cell counter: Coulter counter)
- 4.4 Automation in Microbiology Laboratory (BECTEK & VITEK SYSTEM)
- 4.5 Automation in Pathology Laboratory

References:

- 1) Watson J. D., Baker T. A., Bell S. P., Gann A., Levine M. and Losich R. (2010). *Molecular Biology of the Gene*, 5th ed., Pearson.
- 2) Burtis C. A. and Ashwood E. R. (1998). *Tietz Textbook of Clinical Chemistry*. 3rd ed., Harcourt Brace & Company ASIA PTE LTD.
- 3) Godkar P. B. (2014). *Textbook of Medical Laboratory Technology*, 3rd ed., Bhalani Publishing house.
- 4) John Bernard Henry, Todd, Sanford and Davidsohn, (2003). *Clinical Diagnosis and Management by Laboratory Methods*, 17th ed., All India Traveller Book Seller.

Additional References:

- 1) Ochei J. and Kolhatkar A. (2000). *Medical Laboratory Science: Theory and Practice*, Mc Graw Hill Education (India) Private Limited, New Delhi.
- 2) Wilson K. and Walker J. (2005). *Principles and techniques of Biochemistry and Molecular Biology*, 6th ed., Cambridge University Press.

Medical Technology Practical

SEMESTER – 6

- 1) Examination of fungi from clinical specimen by Lactophenol cotton blue & KOH method
- 2) Detection of malarial parasites by immunochromatographic test / Blood smear
- 3) Lab. Study of parasites present in
 - (i) Stool: *Giardia lamblia*, *Entamoeba histolytica* & *Ascaris lumbricoides*
 - (ii) Urine: *Trichomonas vaginalis*, *Enterobius vermicularis* & *Schistosoma haematobium*
 - (iii) Blood: *Plasmodium spp.*, *Microfilaria* & *Leishmania donovani*
- 4) Diagnosis of typhoid by Widal Slide test
- 5) Diagnosis of typhoid by Widal tube test
- 6) Rapid test for diagnosis of Typhoid
- 7) Rheumatoid Arthritis test
- 8) Pregnancy test
- 9) Diagnosis of syphilis by RPR/ VDRL tests
- 10) Rapid test for detection of HBsAg
- 11) Rapid test for detection of HAV
- 12) Rapid test for detection of HEV
- 13) Rapid test for detection of HCV
- 14) Rapid test for detection of Anti HIV antibodies
- 15) Test for CRP
- 16) ASO test
- 17) Rapid tests for Leptospirosis, Chikungunia, Dengue, NS₁Ag (Demonstraion)
- 18) FNAC Smear staining by PAP staining
- 19) Histological technique: Tissue processing
 - Block preparation
 - Microtomy
 - Staining – Hematoxylen & Eosin Stain
- 20) ABO blood grouping: a) Forward grouping b) reverse grouping
- 21) Rh Typing: a) Direct method: Saline method
 - b) Indirect method: (i) Albumin replacement method & (ii) AHG method
- 22) Direct Anti-Human globulin test
- 23) Determination of incomplete antibody by Indirect Anti-Human globulin test
- 24) Determination of Anti A titer by saline method
- 25) Determination of Anti B titer by saline method
- 26) Determination of Anti D titer: a) Albumin method & b) Indirect antiglobulin method
- 27) Cross matching
- 28) Blood component preparation (Demonstration)
- 29) Renal Function test
- 30) Liver function test
- 31) Cardiac function test
- 32) Measurement of T₃, T₄ & TSH (Demonstration)
- 33) Automation in Bacteriology by BACTEK & VITEK System (Demonstration)

References:

- 1) Godkar P. B. (2014). *Textbook of Medical Laboratory Technology*, 3rd ed., Bhalani Publishing house.
- 2) Ochei J. and Kolhatkar A. (2000). *Medical Laboratory Science: Theory and Practice*, Mc Graw Hill Education (India) Private Limited, New Delhi.
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- 4) Chatterjee K.D. (2009). *Parastology: Protozoology and Helthminthology in Relation to Clinical Medicine*, 13th ed., CBC Publishers & Distributors Pvt Ltd.
- 5) John Bernard Henry, Todd, Sanford and Davidsohn, (2003). *Clinical Diagnosis and Management by Laboratory Methods*, 17th ed., All India Traveller Book Seller.
- 6) Makroo R. N. and Mitra J. *Compendium Transfusion Medicine*.
- 7) Varley Harold, *Practical Clinical Biochemistry*, 4e, CBC Publishing.
- 8) Chawla Ranjan, *Practical Clinical Biochemistry: Methods and Interpretation*, 2nd ed. Jaypee Brothers.

Veer Narmad South Gujarat University, Surat

IDS for T. Y. B. Sc. Semester – V as per CBCS

Biostatistics and Bioinformatics

Unit - 1 Introduction to Biostatistics

- 1.1 Definition, Application & Role of Bioistatistics
- 1.2 Some definitions concerning statistics inference
- 1.3 Data, its collection and classification
- 1.4 Variables and Constant
- 1.5 Accuracy and Presition

Unit - 2 Mesures of Central Tendency

- 2.1 Introduction and characteristics of an ideal measure of Central Tendency
- 2.2 Arithmetic mean: Calculation, merits, demerits and use
- 2.3 Median: Calculation, merits, demerits and use
- 2.4 Mode: Calculation, merits, demerits and use
- 2.5 Empirical relation between mean, median & mode
- 2.6 Standard deviation: Calculation, merits, demerits and use
- 2.7 Variance and Coefficient of variation

Unit - 3 Introduction to Bioinformatics

- 3.1 Introduction to Bioinformatics
- 3.2 Branches of Bioinformatics: Genomics, Transcriptomics, Proteomics & Metabolomics
- 3.3 Aim of Bioinformatics
- 3.4 Research areas of Bioinformatics

Unit - 4 Data Analysis Tools

- 4.1 Biological Databases
- 4.2 Features of Biological Databases
- 4.3 Classification of Biological Database Based on Data Type
- 4.4 Classification Biological Database Based on Data Source
- 4.5 Biological Database Retrieval System

References :

- 1) Arora P. N. (2007). Biostatistics. Himalaya Publishing House
- 2) Ghosh Z. and Mallick B. (2009). *Bioinformatics: Principles and Applications*. Oxford University Press.

Additional References:

- 1) Xiong J. (2009). *Essential Bioinformatics*. Cambridge University Press.
- 2) Orpita Basu and Thukral S. K. (2008). *Bioinformatics: Databases, Tools and Algorithms*. Oxford University Press.
- 3) Sundar Rao, P. S. S. (2006). *Introduction to Biostatistics and Research Methods*. 4th ed., Prentice-Hall of India Private Limited, New Delhi.
- 4) Gurumani N. (2005). *An Introduction to Biostatistics*. 2nd ed., MJP Publishers, Chennai

Veer Narmad South Gujarat University, Surat
IDS for T. Y. B. Sc. Semester – VI as per CBCS
Toxicology and Cancer & Tumor Markers

Unit - 1 Cancer

- 1.1 Introduction, Definition and Characteristics of Cancer
- 1.2 Pathophysiology of cancer
- 1.3 Carcinogens
- 1.4 Oncogens and its mechanism of action
- 1.5 Characteristics of growing tumor cells

Unit - 2 Tumor Markers

- 2.1 Introduction
- 2.2 Tumor markers
- 2.3 Bladder cancer markers and antigens
- 2.4 Genetic markers
- 2.5 Biomarkers still in research

Unit - 3 Detection of cancer and tumor markers

- 3.1 Determination of Alphafetoprotein
- 3.2 Determination of Prostate specific antigen
- 3.3 Determination of Tumor markers by ELFA
- 3.4 Determination of CA 125 II

Unit - 4 Toxicology

- 4.1 Introduction to Toxicology
- 4.2 Metabolism and Excretion of drugs
- 4.3 Relation between Plasma concentration of Drugs and their cellular effects
- 4.4 Methods and Principle for determination of:
 - 4.4.1 Common antiepileptic and Valproic drugs
 - 4.4.2 Digoxine, Bronchodilators and Lithium
 - 4.4.3 Cyclosporin, Ethanol & Methanol

References :

- 1) Godkar P. B. (2014). *Textbook of Medical Laboratory Technology*, 3rd ed., Bhalani Publishing house.