

REVISED SYLLABUS FOR P.G.DIPLOMA OF MEDICAL TECHNOLOGY  
(EFFECTIVE FROM JULY-2014)

PAPER - I MICROBIOLOGY & IMMUNOLOGY

SECTION – I MICROBIOLOGY

1. EVOLUTION AND HISTORY OF MICROBIOLOGY:

- a. Introduction and brief history of Microbiology.
- b. Contribution of following in Medical Microbiology
  - i) Leeuwenhoek
  - ii) Louis Pasteur
  - iii) Robert Koch
  - iv) Edward Jenner
  - v) Lord Lister
  - vi) Paul Ehrlich
  - vii) Domagk
  - viii) Alexander Flemming
  - ix) Elie Metchnikoff

2. CLASSIFICATION OF MICROORGANISMS:

- Introduction –
  - i) Microorganism,
  - ii) Groups of microorganism
  - iii) Place of microorganism in living world.
  - iv) Difference between Prokaryotes and Eukaryotes.
  - v) The world of bacteria- significance of Bergey's Manual.

3. MICROSCOPIC EXAMINATION OF MICROORGANISMS:

- a. Introduction and use of Microscope in the study of Bacteria
  - i) Light microscope and Electron microscope
  - ii) Bright field microscopy
  - iii) Dark field microscopy
  - iv) Fluorescence microscopy
  - v) Phase Contrast microscopy
  - vi) Electron microscopy
- b. Preparation of microorganism for light microscopic examination
  - a) Wet Mount
  - b) Hanging drop techniques
  - c) Staining of Bacteria:
    - 1. Composition and Preparation of Staining
    - 2. Principle and Procedure of Bacteriological stain
      - i. Simple staining
      - ii. Gram staining
      - iii. Acid fast staining
      - iv. Metachromatic granules staining
      - v. Negative staining

- vi. Spirochete staining
- vii. Capsule staining
- viii. Spore staining

#### **4. CULTIVATION OF BACTERIA:**

- i) Nutritional requirements
- ii) Nutritional types of bacteria
- iii) Bacteriological media
- iv) Physical condition for growth
- v) Classification and choice of media
- vi) Conditions of incubation (Both for aerobic and anaerobic cultures)

#### **5. PURE CULTURES AND CULTURAL CHARACTERISTICS:**

Introduction -

- i) Pure culture and mixed culture.
- ii) Methods of isolation of pure culture,
- iii) Maintenance and preservation of pure culture.
- iv) Culture characteristics –
  - i. Growth on agar slants,
  - ii. Growth in broth,
  - iii. Growth in stabs;
  - iv. Colony characteristics, Growth characteristics.

#### **6. STERILIZATION AND DISINFECTION:**

- a. Introduction and definition of the terms:
  - i) Sterilization,
  - ii) Disinfection and Disinfectant,
  - iii) Antiseptic, sanitizer,
  - iv) Germicide,
  - v) Bactericide,
  - vi) Bacteriostasis,
  - vii) Sepsis
  - viii) Asepsis and Antimicrobial agent.
- b. Factors affecting sterilization and disinfection.
  - i) Sterilization Methods- by heat, chemicals, radiation and filtration.
  - ii) Characteristic of ideal disinfectant.
  - iii) Major group of chemical agents as disinfectants.

#### **7. BACTERIA OF MEDICAL IMPORTANCE:**

Classification, antigenic structure, pathogenicity, diseases caused, isolation, characterization-Morphology, cultivation and laboratory diagnosis including specimen collection of the following bacteria.

- i) Staphylococcus
- ii) Streptococcus
- iii) Bacillus
- iv) Salmonella, Proteus, Escherichia, Pseudomonas, Klebsiella
- v) Bordetella and Neisseria
- vi) Spirochaetes: Treponema, Leptospira, Borrelia
- vii) Vibrio
- viii) Corynebacterium

- ix) Mycobacterium
- x) Clostridium.

## **8. INTRODUCTION TO MYCOSES**

- a. Introduction, Morphology and Structure of fungi
- b. classification of pathogenic fungi.
- c. Nutrition and cultivation of fungi.
- d. Cutaneous, Sub cutaneous and Systemic Mycosis ( in brief)
- e. Lab diagnosis of fungal Infections
- f. Opportunistic fungal infections

## **9. VIRAL INFECTIONS TO HUMAN:**

- a. General properties of viruses,
- b. Classification of viruses
- c. Lab diagnosis of viral infections
- d. Cultivation of viruses
- e. Diseases caused, laboratory diagnosis and prevention of following viruses,
  - i)AIDS
  - ii)Hepatitis
  - iii)Polio
  - iv)Dengue
  - v)Postnatal/Congenital infections due to CMV
  - vi)Herpes Simplex Virus
  - vii)Rubella

## **10. BIOSAFETY:**

- i)Principles of biosafety
- ii)Decontamination
- iii)Disposal of wastes

## **11. ADVANCED METHODS FOR MICROBIAL DETECTION**

- i) Automation in Microbiology and antibiotic Sensitivity test  
(Bactac, API 20E, Vitek )
- ii) Nucleic acid testing methods

## **12. QUALITY CONTROL IN MICROBIOLOGY**

# **SECTION - II IMMUNOLOGY**

## **1. INTRODUCTION TO IMMUNOLOGY**

### **2. IMMUNITY**

- i)Introduction
- ii)Classification of immunity
  - (1)Innate immunity
  - (2)Acquired immunity
  - (3)Active & Passive immunity
  - (4)Cell mediated immunity
  - (5)Humoral immunity

### **3. COMPONENTS OF IMMUNOSYSTEM**

- i) Phagocytic cells
- ii) T cells
- iii) B cells

#### 4. **ANTIGEN**

Introduction-

- i) Types – Immunogens & Haptens
- ii) Heterophile & Forssman antigen
- iii) Antigenic Determinants
- iv) Immunogenicity

#### 5. **ANTIBODY**

- i) Structure & Diversity of antibody
- ii) Monoclonal Antibodies and their production
- iii) Polyclonal antibody

#### 6. **COMPLEMENT**

- i) Introduction
- ii) Activation Various Pathway
- iii) Complement fixation test

#### 7. **HYPERSENSITIVITY**

- i) Introduction and classification of Hypersensitivity
- ii) Immediate & delayed Hypersensitivity
- iii) Anaphylactic reaction
- iv) Tuberculin skin test

#### 8. **AUTOIMMUNITY**

Basic concepts of Autoimmunity

#### 9. **VACCINES**

- i) Introduction
- ii) Vaccination Schedule in India

#### 10. **ANTIGEN-ANTIBODY REACTION & THEIR APPLICATIONS:**

- i) Precipitation tests: The ring test, Agar diffusion methods.
- ii) Agglutination tests: Tube test, agglutination microscopic and macroscopic test.
- iii) Other serological test: Fluorescent – antibody technique, Haemagglutination test. Lateral flow through assays and Immunochromatography test.
- iv) Introduction to Enzyme linked immunosorbent assay (ELISA), RIA, Dot immunoassay, Western Blot, PCR.

#### **REFERENCE BOOKS:**

01. General Microbiology. Roger Y. Stainer, Edward A. Adelberg and John L. Ingraham, 4<sup>th</sup> ed., Prentice Hall Inc.

02. Mackie and McCartney Medical Microbiology. A Guide to Laboratory Diagnosis and control of Infection. 13<sup>th</sup> ed., J.P.Duguid, B.P.Marmion and R.H.A.Swain, The English Language Book Society and Churchill Company.
03. Bailey and Scotts Diagnostic Microbiology. Sydney M. Finegold and Ellen Jo Barot, 7<sup>th</sup> ed., The C.V.Mosby Company.
04. Microbiology. Pelczer, Reid Chah. 5<sup>th</sup> ed., Tata Mcgraw Hill Publishing co, Ltd.
05. Manual of Clinical Microbiology. Murray,Baron,Pfaller, Tenover, Yolken, 6<sup>th</sup> ed., American Society for Microbiology.
06. Text book of Microbiology. R.Ananthnarayan and C.K.Jayram Paniker, 5<sup>th</sup> ed., Crient Longman.
07. Text Book of Immunology. James T. Barrett. 5<sup>th</sup> ed.,The C.V.Mosby co.
08. Essential Immunology. Irvan M. Roitt. 6<sup>th</sup> ed., ELBS and Blackwell Scientific Publication.
09. Immunology. Richard M.Hyde. 3<sup>rd</sup> ed., (NMS) Indian Edition,Williams and Wilkins,Baltimore, Maryland.
10. Modern Immunology A. Dasgupta. 2<sup>nd</sup> ed., 1992,Jaypee Brothers Medical Publishers.
11. Immunology. Weir. 7<sup>th</sup> ed., ELBS,Churchill Livingstone, ELBS students Edition.
12. Immunology for post graduation, Dulsy-Fatima, Arumugam, Saras Publication.
13. A text book of Microbiology, P. Chakraborty.
14. Microbiology, 5<sup>th</sup> edition, Lansing M.Prescott, John P.Harley, Donald A. Klein, McGraw Hill.
15. District laboratory practice in tropical countries VOL-2, Monica Cheesbrough, Cambridge University Press.
16. A text book of Microbiology and immunology, 2<sup>nd</sup> Edition, Subhash Chandra Parija, ELSEVIER, a division of Reed Elsevier India Private Ltd.

14. Lynch's Medical Laboratory Technology, 4<sup>th</sup> ed., Raphael, Asian Edition, Saunders Company Publication.
15. Textbook of biochemistry for medical students, 4<sup>th</sup> edition, D.M.Vasudevan, Shreekumari S. Jaypee brothers medical pub.ltd,Newdelhi.
16. Biochemistry, 3<sup>rd</sup> edition, U. Satyanarayan, U. Chakrapani, Books & Allied Pvt Ltd Kolkatta.
17. Textbook of medical biochemistry, 5<sup>th</sup> edition, M.N.Chatterjee, Rana Shinde, Jaypee brothers Medicalpub Ltd,New delhi.

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT  
PROPOSED MODIFIED REVISED PRACTICAL SYLLABUS OF  
DIPLOMA IN MEDICAL TECHNOLOGY  
(Effective from July-2014)**

**PRACTICALS BASED ON PAPER – 1**

**SECTION – I            MICROBIOLOGY**

1. Study of Compound Microscope.
2. Cleaning, Neutralization and preparation of glassware for sterilization.
3. Examination of living Bacteria.
  - a) Wet mount preparation
  - b) Hanging – drop technique.
  - c) 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 Stain
  - b) The Acid fast Staining.
- (C) Special Staining
  - a) The Spirocheate Stain
  - b) The Metachromatic Granules Stain.
  - c) The spore Stain
  - d) The Capsule Stain
  - e) The Flagella Stain
4. Study of some important biochemical reactions.
  - a)Indole Test.
  - b)Methyl red Test.
  - c)V.P. Test.
  - d)Citrate Utilization Test.
  - e)H<sub>2</sub>S Production (2% peptone)
  - f)Study of TSI slants with different
  - g)Fermentation of Sugars
  - h)Test for enzyme activity-Oxidase, Catalase, Coagulase, Urease,

5. Preparation of media, pH adjustment and preparation of buffers

(A) Bacteriological Media

- a) Nutrient agar
  - b) MacConkey' agar
  - c) EMB agar
  - d) Wilson & Blair's agar for Salmonella sp.
  - e) CLED medium for Urinary Tract Infection.
  - f) King's medium for Pseudomonas sp.
  - g) Manitol Salt agar for Staphylococcus sp.
- | For Enteric Bacteria

(B) Mycological Media

- a) Potato – dextrose agar.
- b) Glucose Yeast Extract agar.
- c) Sabouraud' agar

6. PURE CULTURE STUDY OF THE FOLLOWING CULTURES.

- (i) *Bacillus cereus*
- (ii) *Staphylococcus aureus*
- (iii) *Escherichia coli*
- (iv) *Enterobacter aerogenes*(*Klebsiella mobilis*)
- (v) *Klebsiella pneumoniae*
- (vi) *Proteus vulgaris*
- (viii) *Salmonella typhi* / *paratyphi A* / *paratyphi B*
- (ix) *Pseudomonas aeruginosa*

7. Demonstration of common fungi - Penicillin, Aspergillus, Rhizopus, Mucor, Yeast.

8. Isolation and identification of aerobic and anaerobic bacterial / pathogens from pathological specimens.

**SECTION – II                    IMMUNOLOGY**

Diagnostic tests:

- 1. ICT/Dot immunoassay/ Flow through assay for HIV Ab
- 2. ICT/Dot immunoassay/ Flow through assay for HBs Ag
- 3. ICT/Dot immunoassay/ Flow through assay for HCV Ab
- 4. Slide / Tube/ Strip / Cassette, Dot immunoassay test for typhoid
- 5. Slide test for syphilis/Flow through /Spot/ Immunodot for Syphilis
- 7. Slide / Strip / Cassette test for Pregnancy
- 8. Latex test for Rheumatoid arthritis
- 9. Latex test for C-Reactive protein
- 10. Latex test for Anti Streptolysin O(ASO).
- 11. Immunoassays for Tuberculosis
- 12. Leptospirosis ICT (Demonstration)
- 13. Chickungunya ICT (IgG,IgM ) (Demonstration)
- 14. Mantoux test. (Demonstration)

**REFERENCE BOOKS :**

- 1. Medical Laboratory Technology. 5<sup>th</sup> Reprint 1999, Vol. I,II & III, K.L.Mukharjee Tata McGraw Hill.
- 2. Text Book of Medical Laboratory Technology, P.B.Godkar, 1994, Bhalani Publishing House.
- 3. Medical Laboratory Technology, Ramnik Sood 4<sup>th</sup> ed., 1994, Jaippee brothers.
- 4. Hand book of Medical Laboratory Technology.Bharucha, Meverm, Mody Carman.

