# SYLLABUS OF MEDICAL LAB TECHNOLOGY

F -19, Naveen Shahdara Near Shyamlal college Opp. M.C.D office

INDEX:

# DETAILED SYLLABUS

# MICROBIOLOGY

## General Microbiology

1. Sterilization – Introduction, Different Methods and Uses.
2. Laboratory hazards and laboratory safety procedure.
3. Biomedical waste management
4. Clinical laboratory instruments
    1. Incubator
    2. Hot air oven
    3. Autoclave
    4. Water bath
    5. Laminar flow chamber
    6. Colony counter
5. Microscopes – Introduction, types and uses.
6. Collection and transportation.

## BACTERIOLOGY

1. Bacteria – Introduction, classification and bacterial growth.
2. Culture media – classification and preparation of media used in laboratory.
3. Culture methods
4. Colony counting methods
5. Bacterial staining – Gram staining , A.F.B staining, capsule and Albert's stain
6. Biochemical test and their interpretation
7. Antibiotic sensitivity test
8. Difference between gram positive and gram negative bacteria

9. Morphology, culture characteristics, identification, disease caused and laboratory diagnosis of the following bacteria :-
    a. Staphylococcus
    b. Streptococcus
    c. Streptococcus pneumonia
    d. Neisseria
    e. Corynebacterium
    f. Mycobacteria
    g. Bacillus
    h. Shigella
    i. Salmonella
    j. E.coli
    k. Klebsiella
    l. Proteus
    m. Vibrio
    n. Pseudomonas

## PARASITOLOGY

1. Basic classification of protozoa and helminths.
2. Stool examination.
3. Structure, life cycle, pathogenesis and laboratory diagnosis of :-

Protozoa -

a. Entamoeba
b. Trichomonas
c. Giardia
d. Plasmodium
e. Lieshmania
f. Toxoplasma
g. Cryptosporidium

Helminths –

a. Taenia solium and taenia saginata
b. Echinococcus
c. Ascaris lumbricoides
d. Ancylostoma strongyloides
e. Enterobius
f. Filarial

## Mycology

1. Morphology, classification of fungi.
2. Stain used in mycology
3. Laboratory diagnosis :-

**Superficial mycoses** -

a. Dermatophytes
b. Candidiasis
c. Malassezia furfur

**Subcutaneous mycoses** –

1. Mycetoma

**Systemic mycoses -**

a. Histoplasmosis
b. Cryptococcosis

**Opportunistic fungi**

a. Aspergillosis
b. Pencillosis

## VIROLOGY

1. General properties of viruses.
2. Collection, transportation and storage of samples for viral diagnosis and cultivation of viruses.
3. Pathogenesis, laboratory diagnosis, prevention and controls of the following :-
    a. Herpes virus
    b. Hepatitis
    c. HIV
    d. Rabies
    e. Poliomyelitis
    f. Influenza virus
    g. Rubella
    h. Mumps
    i. Measles
    j. Rota virus
    k. Japanese encephalitis
    l. Dengue
    m. Chikungunya
    n. Kyasanur forest disease

## SEROLOGY AND IMMUNOLOGY

1. Antigen and Antibody – Introduction and types
2. Types of antigen antibody reactions
3. Serum Examination :-
    a. ELISA
    b. RIA
    c. Widal test
    d. VDRL test
    e. Aldehyde test
    f. ASO titer
    g. RA
    h. CRP
    i. HBsAg
    j. HBcAg
    k. Anti HCV
    l. Anti HIV

# BIOCHEMISTRY

1. Collection, separation, preservation and transportation of the biological specimens.
2. Clinical laboratory Instruments
    a. Balance
    b. Oven
    c. Water Bath
    d. Incubator
    e. Centrifuge
    f. PH meter
3. Concept of solute, solvent and colloidal solutions, normal solutions, molar solutions, osmolar solutions, standard solution (primary and secondary) and ionic strength of solution.
4. Acid, base and buffer.
5. Photometry
6. Flame photometry
7. Colorimeter
8. Ion selective electrodes
9. ELISA
10. RIA
11. Electrophoresis
12. Chromatography
13. Carbohydrates – Introduction, Classification, Metabolism, Diagnosis and clinical significance
14. Lipids – Introduction, Classification, Metabolism, Diagnosis and clinical significance
15. Amino Acid and Proteins – Introduction, Classification, Metabolism, Diagnosis and clinical significance
16. Nucleic Acid and Nucleotides
17. Enzymes
18. Biochemical Profile Test :-
    a. Kidney(Renal) Function test
    b. Liver function test
    c. Cardiac function test
    d. Thyroid function test
    e. Electrolytes
    f. Hormone test

# HISTOPATHOLOGY

1. Different human organs and their gross and histological examination
2. Receiving of biopsy specimens
3. Instruments used in histopathology
    a. Paraffin oven
    b. Slide warming plate
    c. Tissue floating bath
    d. Microtome and microtomes knifes
    e. Vacuum embedding oven
4. Fixation of tissues – different types of fixatives
5. Decalcification
6. Tissue processing by manual and automatic methods
7. Blocking
8. Microtomes – Introduction, Uses, Types, Knifes and their types
9. Technique of section cutting
10. Cryostat
11. Mounting – methods and mounting media
12. Preservation of specimens and mounting of museum specimens
13. FNAC
14. Stains used in histopathology laboratory
    a. Routine staining – hematoxylin and eosin staining
    b. Special staining –
        i. P.A.P
        ii. P.A.S
        iii. Oil red O
        iv. Iron stain
        v. Von kossa stain
        vi. Elastic stain
        vii. Acid Schiff
        viii. Mucicarmine stain

# HAEMATOLOGY

1. Introduction
2. Composition of blood and functions
    i. Introduction ,properties ,function of blood
    ii. Components of blood
3. Collection sample
    I. Collection material
    II. Collection method
    III. Types of vessels
    IV. Complications occur during collection samples
    V. Anticoagulants and their types
    VI. Order of drawing sample

4. Red blood cell (RBC):

i. Introduction, function, normal ranges, life span

ii. Morphology and RBC count

iii. High altitude sickness

iv. Reticulocytes count

v. Packed cell volume (PCV)& Erythrocyte Sediment Rate (ESR)

vi. Blood indicies (MCV, MCH, MCHC)

5.White Blood Cell (WBC):

I. Introduction
II. Types of WBC
III. Morphology
IV. Functions
V. Clinical conditions
VI. Normal ranges and life span
VII. TLC and DLC count

6.Platelets

I. Introduction, structure
II. Function
III. Normal ranges
IV. Causes of decreasing platelet

7.Romanowsky Stains

I. Giemsa stain
II. Jenner stain
III. Wright stain
IV. Field stain
V. Leishman stain

8. Hemoglobin

I. Structure
II. Function
III. Types of hemoglobin
IV. Normal Ranges
V. Diseases

9. Estimation of hemoglobin:

I. Sahli's method

ii.CMG (Cyanmetheglobin method)

8.Anemia:

I. Introduction
II. Types of anemia
III. Physiological parameters
IV. Clinical features
V. Diagnosis

11.Coagulation Mechanism:

I. Intrinsic pathway
II. Extrinsic pathway
III. 13 factors

12.Coagulation test:

I. BT/CT
II. PT/APTT
III. FDP

13.Stem cells:

i. Introduction
ii. Types of stem cells
iii. Preservation of stem cells
iv. Hematopoiesis

14.Bone marrow

i. Introduction
ii. Collection
iii. Purpose
iv. Risk Factor
v. Smear Preparation

15.Lupus Erythematosus cell (LE cells)

# ANATOMY & PHYSIOLOGY

Introduction, structure, functions

I. Cells and tissues
II. Skeletal system
III. Digestive system
IV. Respiratory system
V. Circulatory system
VI. Excretory system
VII. Reproductive system
VIII. Nervous system
IX. Endocrine system
X. Lymphatic system
XI. Sense organs

# BLOOD BANKING

1. Introduction to blood bank
2. Blood donor and recipient
3. Types of donor
4. Blood deferrals
    - Temporary deferrals
    - Permanent deferrals
5. Selection of blood donor and rejection criteria
6. Blood bank Phlebotomy
    - Pre-donation procedure
    - Donation
    - Post donation procedure
7. Types of blood bag
8. Anticoagulants used in blood bank
9. Blood and Blood components
    - Preparation
    - Storage
10. Apheresis technique
11. ABO Blood group
    - Introduction
    - Different methods
12. Rhesus blood group system
13. Coombs Test
    - Direct coombs test
    - Indirect coombs test

14. The compatibility test (Cross matching)

- Direct cross match
- Indirect cross match

13. Major viral markers

- Malaria
- Dengue
- HIV
- HbsAg
- HCV

16. Transfusion reaction

17. Prevention of disease transmitted through blood transfusion

18. Quality control in blood bank.

# PROFESSIONAL COMMUNICATION

## Unit-1 Fundamentals of Communication

- Technical Communication: features: Distinction between General and Technical communication; Language as a tool of communication; Levels of communication: Interpersonal, Organizational, Mass communications; The flow of Communication: Downward, Upward, Lateral of Horizontal (Peer group): Importance of technical communication; Barriers to Communication.

## Unit-II Constituents of Technical Written Communication

- Words and Phrases: Word formation. Synonyms and Antonyms; Homophones; Select vocabulary of about 500-1000 New words; Correct Usage: all Parts of Speech; Modals; Concord; Articles; Infinitives; Requisites of Sentence Construction: Paragraph Development: Techniques and Methods- Inductive, Deductive, Spatial, Linear, Chronological etc. The Art of Condensation-various steps.

## Unit-III Business Communication

Principles, Sales & Credit letters;

- Claim and Adjustment Letters; Job application and Resumes. Reports: Types; Significance; Structure, Style & Writing of Reports. Technical Proposal; Parts; Types; Writing of Proposal; Significance. Negotiation & Business Presentation skills.

## Unit-IV Presentation Strategies and Listening Skills.

Defining Purpose; Audience & Local; Organizing Contents; Preparing Outline; Audio-visual Aids; Nuances of Delivery; Body Language; Dimensions of Speech: Syllable; Accent; Pitch; Rhythm; Intonation; Paralinguistic features of voice; Listening Skills: Active Listening, Passive Listening. methods for improving Listening Skills.

## Unit-V Value-Based Text Readings

Following essays form the suggested text book with emphasis on Mechanics of writing.

I. Humanistic and Scientific Approaches to Human Activity by Moody E. Prior.
II. The Language of Literature and Science by A. Huxley.
III. Man, and Nature by J. Bronowski.
IV. The Social Function of Literature by Ian Watt.
V. Science and Survival by Barry Commoner.
VI. The Mother of the Sciences by A.J. Bahm.
VII. The Effect of Scientific Temper on Man by Bertrand Russell.

# BASIC AND ADVANCE COMPUTER

1.Knowing computer: What is Computer, Basic Applications of Computer; Components of Computer System, Central Processing Unit (CPU), VDU, Keyboard and Mouse, Other input/output Devices, Computer Memory, Concepts of Hardware and Software; Concept of Computing, Data and Information; Applications of IECT; Connecting keyboard, mouse, monitor and printer to CPU and checking power supply.

2.Operating Computer using GUI Based Operating System: What is an Operating System; Basics of Popular Operating Systems; The User Interface, Using Mouse; Using right Button of the Mouse and Moving Icons on the screen, Use of Common Icons, Status Bar, Using Menu and Menu-selection, Running an Application, Viewing of File, Folders and Directories, Creating and Renaming of files and folders, Opening and closing of different Windows; Using help; Creating Short cuts, Basics of O.S Setup; Common utilities.

3. Understanding Word Processing: Word Processing Basics; Opening and Closing of documents; Text creation and Manipulation; Formatting of text; Table handling; Spell check, language setting and thesaurus; Printing of word document.

4. Using Spread Sheet: Basics of Spreadsheet; Manipulation of cells; Formulas and Functions; Editing of Spread Sheet, printing of Spread Sheet.

5. Introduction to Internet, WWW and Web Browsers: Basic of Computer networks; LAN, WAN; Concept of Internet; Applications of Internet; connecting to internet; What is ISP; Knowing the Internet; Basics of internet connectivity related troubleshooting, World Wide Web; Web Browsing software's, Search Engines; Understanding URL; Domain name; IP Address; Using e-governance website

6. Communications and collaboration: Basics of electronic mail; Getting an email account; Sending and receiving emails; Accessing sent emails; Using Emails; Document collaboration; Instant Messaging; Netiquettes.

**********THE END**********

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## ABOUT

NIPM Professional coursed in the disciplines of paramedical science, Engineering, Mass communication, Hotel Management, Airlines Tourism & Hospitality Management Courses, institute equipped with advanced study courses was established in Delhi (INDIA) with the objective of providing quality education 10th, 10 + 2 graduate and post graduate levels for young aspirants in a stimulating environment of independent thinking and innovation in various disciplines of hospitality hotel management and health care, NIPM is focused on value addition to the course that it offers to the student community and provides a unique combination of technical excellence, opportunities, choices and experience with rapid globalization of all economic activities, it is imperative that students develop a global outlook to become successful in the international arena.

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# The Director Message:

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Education is basis for all progress, be it in any part of one's lifetime. It is for this very reason that we decided to enter in the service of imparting education over half a decade ago. On behalf of Rajendra Institute of Paramedical and Management, I would like to welcome you.

Our group has a reputation of providing quality education and at the same time maintaining high moral standards. Right from the day one when student become the part of the RIPM family, we make sure that every effort is put in to provide the best of the education and over all personality development. At RIPM we believe in imparting education that is based on conscience and we rear a breed of young minds that are bustling with self Confidence, motivation and ever ready to take up challenges. At RIPM we make every day counts and gets you closer to your long-cherished dreams!

I on behalf of Rajendra Institute of Paramedical and Medical want to assure you as the parents of the wards that at RIPM your children will be provided with the best infrastructural facilities, caring attention and right academic environment, to nurture and shape the bright future of your children's. We welcome to active interest and involvement in the progress and activities of your child.

Director of Nipm:

Ms. Dimple Khanna

Mr. Manoj Kumar

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Ms. Simran Sharma

**With best wishes for bright future**