

SEMESTER I

MSCCMB-101: Human Anatomy

ANATOMY

Introduction of anatomy and Histology, Elementary Histology of cell, Tissues of the body organs and system, Elementary

Anatomy and Histology of :-

a. Skeletal System

Development of bones, types of bones, Micro-anatomical and gross structure of bones, Osteology of human skeleton and various movement of joints.

b. Muscular System

Structure and type of muscles in human body, important muscles and their group action.

c. Circulation System

Structure of heart and blood vessels, Systemic circulation, pulmonary circulation, Portal circulation, and coronary circulation.

d. Lymphatic System

Lymph vessels, Lymph nodes and Lymphoid organs, their structure and functions.

e. Digestive System

Gastrointestinal tract and associated glands (Salivary Glands, Liver, Pancreas etc).

f. Respiratory System

Trachea, Lungs including other air passages.

g. Urinary System

Kidney, ureter and urinary bladder etc.

h. Endocrine System

Thyroid glands, Parathyroid glands, Adrenal glands and Pituitary glands.

i. Female and Male reproductive organs System.

j. Skin and its appendages,

k. Special sense organs: Eye, Ear, Nose Taste buds, Subcutaneous sense organs.

l. Nervous System: Brain, Spinal cord and peripheral nerves.

SEMESTER I

MSCCMB-102: Human Physiology

1. Blood:

Blood volume, composition and function of blood, haemopoiesis, blood coagulation, blood groups, body fluids.

a. Cardiovascular System :

General plan of circulatory system, function of heart and blood vessels (arteries, arterioles, capillaries and veins) heart sound

and E.C.G. nervous control of heart and blood vessels, regulation of blood pressure.

b. Respiratory System

Functional anatomy of respiratory system, mechanism of breathing and exchange of gases in the lungs. Regulation of respiration, Oxygen and. carbondioxide carriage, anoxia, dysproes, cyanisis, artificial respiration and pulmonary function test.

c. Gastrointestinal System :

Alimentary canal and its various glands, digestion of food in mouth, stomach and small intestines, gastro-intestinal tract

movements and absorption. Function of liver and liver function tests and metabolism.

d. Excretory System

Structure and function of kidney and Urinary bladder, Structure and function of skin.

e. Endocrine Glands

Reproductive System:

Endocrine glands and their function. Regulation of endocrine secretion. Physiology of male and female reproductive System.

f. Muscular System:

Types of muscles, innervation of muscles, neuromuscular transmission, mechanism of muscular contraction.

Nervous System :

Neurone and its function, spinal cord and reflex action, sensory end organs and sensory path ways, cerebral cortex and motor path ways. Maintenance of posture and locomotion, automatic nervous system, Physiology of vision, hearing test and olfaction.

SEMESTER I

MSCCMB-103: Clinical Biochemistry

Laboratory management and planning, reception and recording of specimens, Cataloging and indexing, Maintenance of laboratory records.

Knowledge of calibration and volumetric glass wares the underlying principles, care and use of analytical balance, electrical balance, Photoelectric colorimeters, flame Phottometer, PH meter, Absorptionmeter, Visual Colorimeters, Spectrometers, and Electrophoretic apparatus.

Stiring and cleaning of glass wares knowledge of common types of pipettes, Flasks , Funnels, other glass waes and Kipp's apparatus etc.

Anticoagulants, collection and preservation of specimens.

Basic knowledge of Physical Chemistry:

Atom ,molecule ,valancy, ion, atomic weight, molecular weight, acid, base salt-acidimetry and alkalimetry, reduction, and

ionization. Basic knowledge of element, metals and non-metals, their compund and salts, organic solvents, cobohydrates, fats, protein, aminoacids, urea, uric acid and enzyme, indicators.

Symbols of molecular weight of somecommonly used compounds-Acetric acid, Amonium

Hydroxide, clcium chloride copper

sulphATE, hYDROEHLORC acid Nitric acid sodium carbonate sodium chloride, Sodium Hydroxide, Sulphuric

acid, carbon, Chloride, Hydrogen, Oxygen, Nitrogen, Phosphorus, Potassium Silver, Sodium and Sulphur.

Molar Normal and Abnormal solutions, PH buffer solutions acid Preservation of common solutions, Gravimetric and Volumetric methods, Electrophoresis.

Chemical Examination of Urine for Protein, Sugar, Blood, Ketone bodies, Bile Pigment and salt, Urobilinogen, Calcium Chloride etc.

Preparation of solutions, Principle, Specimen, Procedure Calculation, normal value of each tests. Preparation of Protein free

Filtrate, Liver function test:

a. Van den Berg reaction

b. Serum Bilirubin- (Malloy and Evelyn method of Jendrassik and Grof method)

c. Serum Protein- (Biuret method)

d. Serum albumin.

Serum Globulin.

Icteric index-

Lipids:

a. Serum Cholesterol

Glucose Metabolism:

a. Blood sugar fasting and post prandial- (Toluidine methods Folin-Wu and Glucose oxidase methods)

b. Glucose Tolerance test

c. Urine Glucose.

MSCCMB-104: Histopathology

Introduction to Histology, the cell, cell Organelles, nucleus, cell division, tissues, fresh & fixed tissues.

Different types of Embedding Viz. Wax, Resin, Cryostat etc. Basic Cytology

Fixation of tissue, different kind of fixatives, simple fixative, compound fixative, formaldehyde, mercuric chloride, osmium, Picric acid, alcohols, other acids, formaline, buffered formaline, osmic

acid, Zenker's soln, Healy's soln, cytological fixatives, nuclear fixatives, fixation of smear etc., decalcification, method of decalcification, assessment of decalcification, soln for decalcification.

Processing of tissue, dehydration, impregnation in the wax, manual and automatic tissue processor, gelatin embedding, celloidin embedding, double embedding, cytological fixatives, preparation of different smears, vaginal, sputum, membrane.

Microtome, instrument, principle, use in section cutting, parts and working of commonly used microtome, different kinds of microtome, rotary, base sledge, sliding, low temperature microtome, cryostat, microtome knives, homing and stropping knives.

Section cutting of paraffin sections, section preparation from frozen sections, fixing of tissue to slide, preparation of celloidin section and fixation. Staining techniques, natural dyes, synthetic dyes, basic and acidic dyes, haematoxylin staining, Pap, Flucker & Conn, methanamine silver nitrate, Ziehl-Neelsen's stain, propylene glycol Sudan technique, Papanicolaou, Harn's alum, Haematoxylin, acridine orange technique.

SEMESTER I

MSCCMB-105: Introductory Biology

Unit I

Living World

Biology & Its Branches; relationships with other sciences; scientific methods in Biology; historical breakthroughs; scope of biology and career options; role of Biology in dispelling myths and misbeliefs; characters of living organisms, (elementary idea of metabolism, transfer of energy at molecular level, open and closed systems, homeostasis, growth and reproduction, adaptation, survival, death).

Origin and evolution of life - theories of evolution; evidence of evolution; sources of variations

(mutation, recombination, genetic drift, migration, natural selection); concept of species; speciation and isolation (geographical and reproductive); origin of species.

Unit II

Diversity of Life

Variety of living organisms, Systematics; need, history and types of classification (artificial, natural, polygenetic); biosystematics; binomial nomenclature; Two kingdom system, Five kingdom System, their merits and demerits, status of bacteria and virus; botanical gardens and herbaria; zoological parks and museums.

Unit III

Cell and Cell Division

Cell as a basic unit of life - discovery of cell, cell theory, cell as a self - contained unit; prokaryotic and eukaryotic cell; unicellular and multicellular organisms; tools and techniques (compound microscope, electron microscope and cell fractionation); Ultrastructure of prokaryotic and eukaryotic cell - cell wall, cell membrane - unit membrane concept (fluid mosaic model); membrane transport; cellular movement (exocytosis, endocytosis); cell organelles and their functions

- nucleus, mitochondria, plastids, endoplasmic reticulum, Golgi complex, lysosomes, lysosomes, microtubules, centriole, vacuole, cytoskeleton, cilia and flagella, ribosomes.

Molecules of cell; inorganic and organic materials - water, salt, mineral ions, carbohydrates, lipids, amino acids, proteins, nucleotides, nucleic acids (DNA and RNA);

Enzymes (Properties, chemical nature and mechanism of action); vitamins, hormones and steroids.

Unit IV

Genetics

Continuity of life - heredity, variation; Mendel's laws of inheritance, chromosomal basis of inheritance; other patterns of inheritance - incomplete dominance, multiple allelism, quantitative inheritance.

Chromosomes - bacterial cell and eukaryotic cell; parallelism between genes and chromosomes; genome, linkage and crossing over; gene mapping; recombination; sex chromosomes; sex determination; sex linked inheritance; mutation and chromosomal aberrations; Human genetics - methods of study, genetic disorders.

DNA as a genetic material - its structure and replication; structure of RNA and its role in protein synthesis; Gene expression - transcription and translation in prokaryotes and eukaryotes; regulation of gene expression, induction and repression - housekeeping genes; nuclear basis of differentiation and development; oncogenes.

Basics of Recombinant DNA technology; cloning; gene bank; DNA fingerprinting; genomics - principles and applications, transgenic plants, animals and microbes.

Unit V

Morphology of Plants and Animals

Morphology - root, stem and leaf, their structure and modification; Inflorescence, flower, fruit, seed and their types; Description of Poaceae, Liliaceae, Fabaceae, Solanaceae, Brassicaceae and Asteraceae.

Morphology of animals - salient features of earthworm, cockroach and rat; tissue systems, structure and function of tissues - epithelial, connective, muscular and nervous.

Practical

1. Study of parts of Compound Microscope
2. Study of mitosis in onion root tip and animal cell (grasshopper)
3. Study of meiosis in onion flower buds, and testis of grasshopper.
4. Study of cyclosis in leaf cell of Hydrilla, or Tradescantia and in Paramecium.
5. Study of cell wall components (cellulose, lignin, suberin and mucilage).
6. Study of mitochondria by staining with a Janus Green.
7. Study of specimens and their identification with reason - Bacteria, Oscillator, Spirogyra, Rhizopus, mushroom/bracket fungi, yeast, liverwort, moss, fern, Pinus, one monocotyledon, one dicotyledon and lichens.
8. Study of characters of specimens and identification with reason - Amoeba, Hydra, Liver - Fluke, Ascaris, Leech, Earthworm, Prawn, Silk moth honey bee, snail, Starfish, Dogfish, Rohu, Frog, Lizards, Pigeon/ any other bird and rabbit/ any other mammal.
9. Study of squamous epithelium, muscle fibres, nerve cells and mammalian blood film through temporary/permanent slides.
10. Study of external morphology of earthworm, cockroach, frog and rat through models.

MSCCMB-106: Communication & Soft Skills

UNIT I

Essentials of Grammar:

- Parts of Speech
- Punctuation
- Vocabulary Building
- Phonetics

UNIT II

Office Management:

- Types of Correspondence
- Receipt and Dispatch of Mail
- Filing Systems
- Classification of Mail.
- Role & Function of Correspondence
- MIS
- Managing Computer

UNIT III

Letter & Resume Writing:

- Types of Letters-Formal / Informal
- Importance and Function
- Drafting the Applications
- Elements of Structure
- Preparing the Resume
- Do's & Don'ts of Resume
- Helpful Hints

UNIT IV

Presentation Skills:

- Importance of Presentation Skills
- Capturing Data
- Voice & Picture Integration
- Guidelines to make Presentation Interesting
- Body Language
- Voice Modulation
- Audience Awareness
- Presentation Plan
- Visual Aids
- Forms of Layout
- Styles of Presentation.

UNIT V

Interview Preparation:

- Types of Interview
- Preparing for the Interviews
- Attending the Interview
- Interview Process
- Employers Expectations
- General Etiquette
- Dressing Sense
- Postures & Gestures

UNIT VI

Group Discussion & Presentation:

- Definition
- Process
- Guidelines
- Helpful Expressions
- Evaluation

(Note: Every student shall be given 15 minutes. of presentation time & 45 minutes of discussion on his/ her presentation.)

The student will be evaluated on the basis of :

- his / her presentation style
- Feedback of Faculty & Students
- General Etiquette
- Proficiency in Letter Drafting / Interview Preparation

The paper is internal and at least 3 tests will be taken. Best 2 of 3 shall account for final grades (70% Test & 30% Presentation)

SEMESTER I

MSCCMB-107: Practical

- Human Anatomy : 15 Marks
- Human Physiology : 15 Marks
- Clinical Biochemistry : 15 Marks
- Histopathology : 15 Marks
- Introductory Biology : 15 Marks
- Internal Assessment : 25 Marks

SEMESTER II

MSCCMB-201: General Bacteriology

1. Cell Structure

Morphology, Stainings, detailed structure in comparison to Eucaryotic Cell, Bacterial anatomy.

2. Microscopy

Various optical methods available for viewing microorganisms and their application,

3. Overview of microbial world

Classification

Purpose

Basic Principles and classification systems.

4. Growth, survival of microorganisms

-growth curve

-growth parameters

-Survival of micro organisms in natural environment.

-Role of antimicrobial agents

5. Cultivation of Micro organisms

-growth requirements

-sources of metabolic energy

-Bacterial nutrition

-methods of cultivation

6. Microbial Metabolism

-Metabolism of bio synthesis and growth.

-bio synthesis pathway

-energy yielding metabolism

-regulation of metabolic pathways.

7. Bacterial Genetics

-mutation

-conjugation

-genetic mechanism of drug resistance

-genetic engineering

8. Destruction of micro organism.

-sterilization and disinfection

-antimicrobial agents

9. General principles in Diagnostic Microbiology

-collection and handling of various samples

-laboratory safety

-antimicrobial susceptibility and assays

-lab animal an introduction

SEMESTER II

MSCCMB-202: Immunology

Unit – I

Immune response: Immunity, Type (Innate & adaptive immune response)

Organs of Immune System: Primary and Secondary lymphoid organ

Ontogeny and phylogeny of Lymphocytes: T and B Lymphocytes, Null

Unit – II

Cell of Immune System: Mononuclear cell and granulocytes, Antigen presenting cell.

Antigen, Heptanes: Factors effecting immunogenicity, m epitopes (Properties of it)

Antibodies: Structure , Types and function

Unit – III

Complement System : Role of complement system in immune response, complements and Components and activation pathways.

Monoclonal antibodies: Production characterization and applications in diagnosis, therapy and basic research.

Antigen-Antibody interaction, avidity & affinity measurement.

Unit – IV

Hypersensitivity: Definition, factor causing hypersensitivity

Common hypersensitivity reaction, types, classification based on the time taken for reaction

Auto Immune disease

Unit – V

Immunodiagnosics: Precipitation techniques, Agglutination, Fluoresence techniques

ELISA, RIA

Double diffusion and Immuno-electrophoresis.

Immunidiagnosics: VDRL test, Widal test, RA factor, Blood grouping, Rh typing, Comb's test

MSCCMB-203: Haematology

1. Introduction of haematology, composition of blood, cellular and humoral components.
2. Reception labeling and recording of laboratory investigations.
3. Quality control in Individual Laboratory.
4. Cleaning of glass wares, pipettes, ESR tubes and counting chamber. Care of syringes and Needles.
5. Error in procedure / Sources of Error .
6. Preparation of capillary pipettes, Distilled water, reagents Buffer and Normal solutions.
7. Collection of specimen, difference between capillary and artery and venous blood specimen use of each.
8. Preparation and examination of thin, thick and wet blood films for blood parasite. Stained blood films -Leishman's, wright's, Simon's stain and supravital.
9. Preparation of solutions.
10. Normal and abnormal blood cells morphology -erythrocytes, leucocytes, platelets, reticulocytes count.
11. Recognition of principle blood pictures, knowledge about the Anaemia and Leukamias. Abnormalities of RBCS -shape, size, colour, premature RBCS (RBCS series and WBCS series).
12. Methods of measuring haemoglobin including spectro photometric, method PCV, MCH, MCHC & MCV and ESR.
13. a) Total WBC and RBC count -Micropipette and bulk dilution methods.
b) Packed cell volume (Haematocrit) -macro and or micro methods.
c) Calculation and interpretation of cell Indices (absolute values)
d) Differential count of WBC, including Arneth, and Schilling counts.
e) Absolute Eosinophil counts.
f) Platelets count direct and indirect.
g) Bleeding and clotting time -Duke and Ivy methods.
h) Erythrocyt~s sedimentation rate.
i) Normal and Abnormal values.

- 14.a) Recognition of blood parasites.
- b) Malaria and its life cycles and Differential diagnoses of malaria parasite.
- c) Kala -azar (L.D. bodies)
- d) Spirochaetes.
- e) Trypanosomes
- f) Microfilaria

SEMESTER II

MSCCMB-204: Blood Banking

1. Principal of Immuno haematology.
2. Blood Bank management and planning, The reception and recording of specimens, Cataloging and indexing, Maintenance of Blood Bank records.
3. Knowledge of Maintenance and working of blood strong cabinets.
4. Preparation and sterilization of transfusion sets.
5. Preparation and use of ACD (acid citrate dextrose), EDTA, Heparin, CPD Citrate Phosphate Dextrose) .
6. Theory including inheritance and nomenclature of ABO and Rh, blood group system other blood groups.
7. Subgroups of ABO blood group system.
8. Techniques for determination of various blood groups.
9. Sources of errors in grouping and their elimination.
10. Selection and preparation of grouping sera.
11. Group sera titration.
12. Criteria for selecting and rejecting Donors.
13. Method & Precaution of Blood Collection.
14. preservation of Blood.
15. Ante -natal investigation.
16. Coombs test compatibility and techniques -Direct and Indirect methods.
17. Cross matching techniques.
18. Investigation of Malaria and Microfilaria. HIV test ABS Ag.
19. Investigation of VDRL I Kahn test.
20. Blood collection and preservation.
21. Quality control in Blood Bank.
22. Disposal of used and other materials of Blood Bank.

MSCCMB-205: Practical

- General Bacteriology : 20 Marks
Immunology : 20 Marks
Haematology : 15 Marks
Blood Banking : 20 Marks
Internal Assessment : 25 Marks

SEMESTER III

MSCCMB-301: Systematic Bacteriology

Systematic Study of microbes of medical Importance

I.a) Gram +ve cocci

b) Gram -ve cocci

c) Gram +ve Bacilli

d) Gram -ve Bacilli

e) Vibrio cholera

f) Brucella

g) Haemophilus

h) Bordetella

i) Spirochaetes

j) Anaerobic Bacteria, etc.

1. Study of the morphology I cultural, biochemical and other biological properties and characteristics of above said medically important Bacteria.

2. The mechanism of virulence and pathogenesis and pathology.

3. The disease caused by them epidemiology treatment prevention and control.

SEMESTER III

MSCCMB-302: Applied Microbiology

- Normal flora of the human body

- Collection of clinical specimens for diagnosis and method of processing

- antibiotic susceptibility testing and its interpretation and reporting.

- Nosocomial infection -surveillance and control.

- Diseases transmitted through air, water, milk and food.

- Quality control in diagnostic microbiology.

- National programmes for control of infectious diseases.

- Etiology, laboratory diagnosis of infectious diseases of each system.

SEMESTER III

MSCCMB-303: Basic Cellular Pathology

Study of body tissues- Epithelial tissue, connective tissue including bone and cartilage, muscular tissue Study of various systems- Circulatory system, alimentary system, digestive system

including liver, pancreas and gall bladder,

Respiratory system

Microscopy - Working principle, maintenance and applications of various types of microscopes -

Darkground microscope,

polarizing microscope, phase contrast microscope, Interference microscope, U.V. light

microscope, micrometry

Metachromasis and Metachromatic dyes

Haematoxylin stain, its importance in histology.

Stains, cytological preparation with special emphasis on MGG, PAPANTICOLOU stains.

Special stains like PAS, Mucicarmine, Alcian blue, Schmorl, Acid phosphatase

SEMESTER III

MSCCMB-304: Molecular Biology

Basic knowledge as applicable to molecular diagnostics and molecular epidemiology.

Basic knowledge only of the following

1. Recombinant DNA technology.
2. Southern, northern and western blotting.
3. DNA amplification techniques.
4. Diagnostic PCR, different methods of PCR product detection (liquid hybridization, Elisa.)
5. Genotyping of microbes and viruses.

MSCCMB-305: Practical

Systematic Bacteriology : 15 Marks

Applied Microbiology : 20 Marks

Basic Cellular Pathology : 20 Marks

Molecular Biology : 20 Marks

Internal Assessment : 25 Marks

SEMESTER IV

MSCCMB-401: Virology

Unit – I

General morphology and ultra structure of Viruses: Capsids- Helical Symmetry, icosahedral symmetry and complex symmetry.

Envelope: Glycoprotein and matrix protein

Viral genome: their types and structure

Unit – II

Cultivation of Viruses in embryonated eggs, experimental animals and cell culture: primary and secondary cell culture, suspension cell culture and monolayer cell cultures.

Assays of viruses: physical and chemical methods of assays (protein nuclei acid, radioactivity traces, electrons microscopy, plaque method, pock counting method, end point method and infectivity of plant viruses).

Serological methods: haemagglutination haemagglutinationinhibition, complement fixation, immunofluorescence assays

(IFA) ELISA, RIA.

Unit – III

Plant viruses: Recent advances in classification of plant viruses

Life sciences and other details of TMV and mosaic virus, potato virus X

General idea about cyanophages, actinophages and mycoviruses.

Unit – IV

Bacteriophages: Classification, Morphology and ultrastructure

One step growth curve (Latent period, eclipse period and burst size)

Life cycle: Lytic and Lysogenic cycles of bacteriophages

Unit – V

Animal viruses; classification and nomenclature

Life cycles and other details of DNA viruses: herpes, adeno and SV40

Life cycle and other details of RNA viruses: Retroviruses, oncogenic viruses and lentiviruses (HIV), picorna, ortho myxo and paramyxo.

SEMESTER IV

MSCCMB-402: Mycology

MyCOLOGY

1. Classification of Fungi
2. Growth and isolation
3. Mycoses (all types)
4. Laboratory diagnosis of mycotic diseases.
5. Immunity in fungal diseases and value of immuno diagnosis.
6. Role of mycotoxin
7. Antifungal agents
8. Epidemiology of fungal diseases.

SEMESTER IV

MSCCMB-403: Parasitology

PARASITOLOGY

- a. General Principles of host parasite interactions and definitions of terms in this connection.
- b. Morphology, life cycle and pathogenesis of the parasites listed below. The students should know the medical importance, laboratory diagnostic methods, drugs used for therapy and Epidemiology.

PROTOZOA

1. Intestinal amoebae.
2. Free living pathogenic amoebae
3. Intestinal and genital flagellates
4. Haemoflagellates
5. Ciliates of medical importance
6. Malarial parasite

HELMINTHS

1. Nematodes
 - (a) Intestinal
 - (b) Tissue
2. Trematodes infection in man.
3. Cestodes infecting man
4. Larval infections in man.

MSCCMB-404: Research Methodology & Techniques

Introduction to Research: Definition, Scope, Limitations, and Types.

Objectives of Research

Research Process

Research Designs

Data Collection: Secondary Data, Primary Data, and Methods of Collection.

Scaling Techniques: Concept, Types, Rating scales & Ranking Scales

Scale Construction Techniques, Multi Dimensional Scaling.

Sampling Designs: Concepts, Types and Techniques

Sample Size Decision

Theory of Estimation and Testing of Hypothesis
Small & Large Sample Tests, Tests of Significance based on t, F , Z test and Chi-Square Test.
Designing Questionnaire.
Interviewing.
Tabulation, Coding, Editing.
Interpretation and Report Writing.

SEMESTER IV

MSCCMB-405: Practical

Virology : 20 Marks

Mycology : 15 Marks

Parasitology : 20 Marks

Research Methodology & Techniques : 20 Marks

Internal Assessment: 25 Marks