

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Syllabus for CBCS

T. Y. B. Sc. Semester system

BIOSCIENCE

(Medical Laboratory Science)

(in force from June 2013)

Semester V

501	Paper - I	Histophysiology
502	Paper - II	Endocrinology
503	Paper - III	Metabolism
504	Paper - IV	Clinical Biochemistry
505	Paper - V	Haematology
506	Paper - VI	Basic Biotechnology
500 P		Practicals

Semester VI

601	Paper - I	Nutrition
602	Paper - II	Blood Banking
603	Paper - III	Clinical Immunology
604	Paper - IV	Medical Microbiology
605	Paper - V	Parasitology & clinical Microbiology
606	Paper - VI	Applied Microbiology
600 P		Practicals

@@@@@

T. Y. B. Sc.

BIOSCIENCE Semester V

Paper - I Histophysiology

Unit : I Microscopic organization some organs of alimentary tract.

- Esophagus.
- Stomach.
- Small intestine.
- Large intestine.

Unit : II Microscopic organization some glands of alimentary tract.

- Salivary gland.
- Pancreas.

Unit : III Microscopic organization & physiological function of some organs

- Liver.
- Gall bladder.
- Kidney.
- Skin.

Unit : IV Chemical composition & physiological function of some digestive juice.

- Saliva.
- Gastric juice.
- Pancreatic juice.
- Bile.

REFERENCES:

A Text book of Histology by Bloom (W. Saunder)
The Living body by Best & Tailor (B.I.pub.)
Text book of Human Anatomy by Hamilton
Anatomy & Physiology for Nurses by Smith (ELBS)
Atlas of Histology by Victor (Williams& Wilkins)
Textbook of Biochemistry & Human Biology by Talwar
Illustrated Physiology by Mackena & Callander (Churchill Livingston)
Physiological basis of Medical Practice by Best & Tailor (B.I.Waverly)

@@@@@

T. Y. B. Sc.

BIOSCIENCE Semester V

Paper – II Endocrinology

Unit : I Introduction to endocrinology.

- Introduction to endocrine glands.
- Hormones – General characteristics.
- Introduction to hypothalamus.
- Hypothalamic hormones.

Unit : II Hypophysis – Master gland.

- Histophysiology of adenohypophysis.
- Histophysiology of neurohypophysis.
- Hormones of the pituitary gland.
- Abnormalities of pituitary gland.

Unit : III Thyroid, parathyroid gland & adrenal gland

- Histophysiology & hormones of thyroid & parathyroid gland.
- Abnormalities of thyroid & parathyroid gland
- Histophysiology & hormones of adrenal gland.
- Abnormalities of adrenal gland.

Unit : IV Gonads (Testis & Ovary)

- Histophysiology of testis.
- Histophysiology of ovary.
- Hormones of gonads – testis & ovary.
- Physiological aspects of menstrual cycle.

REFERENCES:

A Text book of Histology by Bloom (W. Saunder)
The Living body by Best & Taylor (B.I.pub.)
Anatomy & Physiology for Nurses by Smith (ELBS)
Atlas of Histology by Victor (Williams& Wilkins)
Illustrated Physiology by Mackena & Callander (Churchill Livingston)
Physiological basis of Medical Practice by Best & Taylor (B.I.Waverly)

@@@@@

T. Y. B. Sc.

BIOSCIENCE Semester V

Paper - III Metabolism

Unit : I Metabolism of Carbohydrates

- Glycolysis.
- Hexose monophosphate shunt,
- Gluconeogenesis
- Glycogen metabolism.

Unit : II Metabolism of protein & lipid.

- Deamination, Transamination, Decarboxylation.
- Ammonia transport & Urea cycle.
- Overview of lipid metabolism.
- Oxidation of fatty acid, B-oxidation.

Unit : III Common metabolic pathway.

- Mitochondrion shuttle system.
- TCA cycle.
- ETC & oxidative phosphorylation.
- Intermetabolic pathway

Unit : IV Metabolic disorders

- Galactosaemia, Fructosaemia, Lactose intolerance.
- Diabetes.
- Glycogen storage disease.
- PKU, Alkeptonuria, Albinism, Hyperammonaemia

REFERENCES:

Text book of Medical Biochemistry by Chatterjee (Jaypee)
Lehninger`s Principle of Biochemistry
Harper`s Review of Physiological Chemistry (Lange med. Pub)
Harper`s illustrated Biochemistry 26th edition (MacGraw-Hill)
Fundamentals of Biochemistry by A.C.Deb
Biochemistry by Mrs. Pankaja Naik (Carrier)

@@@@@

T. Y. B. Sc.

BIOSCIENCE Semester V

Paper - IV Clinical Biochemistry

Unit : I Analysis of body fluids – Urine.

- Collection & preservation of urine.
- Types of urine specimen.
- Physical & chemical examination of urine.
- Microscopic examination of urine.

Unit : I Analysis of body fluids - CSF & semen.

- Collection & preservation CSF.
- Physical, chemical & microscopic examination of CSF.
- Physiology & collection of seminal fluid.
- Physical, chemical & microscopic examination of semen.

Unit : III Routine examination of Sputum & Stool.

- General Aspect & collection of sputum.
- Routine examination of Sputum.
- Collection of stool.
- Routine examination of Stool.

Unit : IV Organ function test - II

- Liver function test
- Kidney function test
- Pancreatic function test
- Cardiac profile test

REFERENCES:

Medical Laboratory Technology by Praful Godkar (Bhalani pub.)
Medical Laboratory Science by Kolhatkar (Tata McGraw-Hill)
Clinical Laboratory Methods by Ackermann (Mosby pub.)
District Laboratory Practice in Tropical Countries Part – I & II by Monika Cheesbraugh (Cambridge)
Microbiology, sixth edition by Prescott, Harley & Klein (McGraw-Hill)

@@@@@

T. Y. B. Sc.

BIOSCIENCE Semester V

Paper - V Hematology

Unit : I Haematopoiesis

- Hematopoietic system of the body.
- Erythropoiesis.
- Leucopoiesis.
- Thrombopoiesis.

Unit : II Hemostasis

- Introduction to hemostasis, Blood coagulating factors.
- Blood coagulation – Intrinsic & extrinsic pathway.
- Routine coagulation tests.
- Coagulation & bleeding disorder

Unit : III Disorders of Blood cells

- Disorders of Red cells - Anemia
 - a) Nutritional (Iron, vitamin, protein)
 - b) Infection (Bacterial, viral, parasitic)
- Inherited haemoglobinopathies (SCA, thalassaemia)
- Introduction to disorders of White blood cells.
- Leukemia, lymphomas & multiple myelomas

Unit : IV Clinical hematology

- Blood collection & preservation.
- Hemoglobin estimation, DC & ESR
- Packed cell volume & Blood indices.
- Introduction to automation in hematology.

REFERENCES:

Clinical Haematology by Wintrobe (K.M.Varghese)
Practical Haematology by Davis
District Laboratory Practice in Tropical Countries Part – I & II by Monika
Cheesbraugh (Cambridge)

@@@@@

T. Y. B. Sc.

BIOSCIENCE Semester V

Paper - VI Basic Biotechnology

Unit : I Gene expression

- Gene expression : Translation (prokaryotes)
- Translation (eukaryotes)
- Regulation of gene expression.
- Lac operon.

Unit : II Introduction to Biotechnology

- Introduction to recombinant technology.
- Restriction endonuclease, DNA ligase.
- Cloning vectors – General characteristics.
- Cloning vectors – Plasmid, phage, cosmids, BAC & YAC.

Unit : III Recombinant DNA technology

- General methods.
- Screening for chimeric molecule.
- Application in various field.
- Transgenic organism.

Unit : IV Advanced techniques.

- DNA hybridization.
- DNA finger printing.
- Polymerase chain reaction.
- Blot technique.

REFERENCES:

Molecular biology & Biotechnology by Walker (Panimas)
Text book of Medical Biochemistry by Chatterjee (Jaypee)
Lehninger's Principle of Biochemistry
Harper's Review of Physiological Chemistry (Lange med. Pub)
Genes by Lewin (Wiley)
Biotechnology by Trehan.
Microbiology, sixth edition by Prescott, Harley & Klein (McGraw-Hill)

@@@@@

BIOSCIENCE

Medical Laboratory Science

T. Y. B. Sc. Bioscience Practical, Semester – V

- Study of some systems of Rat. (dissected animal or model)
 - Digestive system
 - Urinogenital system – Male & female
 - Nervous system
- Study of permanent histological section of some organs, endocrine glands & tissues.
- Analysis of body fluids.
(Physical, chemical & microscopic examination of body fluids)
 - Urine.
 - Cerebrospinal fluid.
 - Semen.
- Liver function test :
 - Estimation of serum bilirubin.
 - Estimation of serum alkaline phosphatase.
 - Estimation of serum SGPT.
 - Estimation of serum total protein & albumin.
- Kidney function test :
 - Estimation of serum creatinine.
 - Estimation of serum uric acid.
 - Estimation of serum urea & urea nitrogen.
- Pancreatic function test :
 - Estimation of serum glucose.
 - Estimation of serum amylase
- Cardiac profile test :
 - Estimation of serum cholesterol.
 - Estimation of serum total lipids.
 - Estimation of serum SGOT

➤ Haematology

Collection & preservation of blood.
Separation of serum, plasma
Hb estimation by cyanmethaemoglobin method.
Haematocrite (PCV)
Blood indices.
Erythrocyte sediment rate
Differential WBC counts.
Absolute eosinophil counts
Reticulocyte counts
Preparation of Heinz body.
Screening of sickle cell anaemia (Dithionate turbidity test)

➤ Study of permanent slide & specimen as per theory

REFERENCES:

Practical Biochemistry by Plummer (Tata MacGraw-Hill)
Laboratory manual in Biochemistry by Jayaraman (Wiley)
Practical Biochemistry by Tikekar
Medical Laboratory Technology by Praful Godkar (Bhalani pub.)
Medical Laboratory Science by Kolhatkar (Tata McGraw-Hill)
Clinical Laboratory Methods by Ackermann (Mosby pub.)
Experimental Microbiology, Vol. I & II by Rakesh Patel (Aaditya)
Practical Haematology by Davis
District Laboratory Practice in Tropical Countries Part – I & II by Monika Cheesbraugh (Cambridge)
Atlas of Histology by Victor (Williams& Wilkins)
Illustrated Physiology by Mackena & Callander (Churchill Livingston)

@@@@@

T. Y. B. Sc.

BIOSCIENCE Semester VI

Paper - I Nutrition

Unit : I VITAMIN

- Introduction to vitamin.
- Fat-soluble vitamin : Vitamin A, D, E, and K
- Water-soluble vitamin : Vitamin C
- Water-soluble vitamin : Vitamin B complex.

Unit : II Trace elements

- Minerals (RDA, physiological role)
- Major minerals
- Trace elements.

Unit : III Nutrition

- Introduction to nutrition.
- Major food factor, Carbohydrates, proteins, fats.
- RDA & Balance diet.
- Nutrition during pregnancy & lactation.

Unit : IV Malnutrition

- Introduction to malnutrition.
- Nutritional problems in public health.
- Low birth weight, anemia
- Protein energy malnutrition.

REFERENCES:

Preventive & social medicine by Park
Text book of Medical Biochemistry by Chatterjee (Jaypee)
Lehninger's Principle of Biochemistry
Harper's Review of Physiological Chemistry (Lange med. Pub)
Harper's illustrated Biochemistry 26th edition (MacGraw-Hill)

@@@@@

T. Y. B. Sc.

BIOSCIENCE Semester VI

Paper - II Blood Banking

Unit : I Introduction to blood banking

- Blood transfusion practice.
- QC in blood transfusion practice.
- Documentation in blood bank.
- Blood/blood component for transfusion.

Unit : II Blood donor

- Blood donors, Types of donor.
- General history & screening of the donor.
- Blood collection, blood donor records.
- Preservation & storage of blood/blood component.

Unit : III Testing of blood

- Testing of donor's blood, Blood grouping - ABO (cell & serum)
- Blood grouping by tile method & Rh typing.
- Compatibility testing (slide, tube & AHG)
- Other serological investigation.

Unit : IV Transfusion reaction.

- Introduction to transfusion complication.
- Types of transfusion reaction.
- Investigation of transfusion reaction.
- Prevention of transfusion reaction.

REFERENCES:

Practical Haematology by Davis
District Laboratory Practice in Tropical Countries Part – I & II by Monika
Cheesbraugh (Cambridge)
Clinical Hematology by Wintrobe (K.M.Vargese)
Medical laboratory science by Kolhatkar (Tata McGraw-Hill)
Hematology – Blood Transfusion Practice (WHO)

@@@@@

T. Y. B. Sc.

BIOSCIENCE Semester VI

Paper - III Clinical Immunology

Unit : I Antigen antibody reaction - I

- Introduction to antigen antibody reaction.
- Opsonization, Neutralization.
- Compliment system
- Compliment fixation test.

Unit : II Antigen antibody reaction – II

- Agglutination (Direct & indirect)
- Application of agglutination.
- Precipitation,
- Gel precipitation.

Unit : III Hypersensitivity & AID

- Introduction to allergic reaction.
- Antibody mediated allergic reaction.
- Cell mediated allergic reaction.
- Introduction to autoimmune diseases.

Unit : IV Modern techniques in immunology

- Hybridoma technique & monoclonal antibody
- ELISA,
- RIA, IFT
- Immunoblot, Immunochromatographic,

REFERENCES:

An Introduction to Immunology by Rao
Immunology & serology by Carpenter (W.B.Saunders)
Modern Immunology by Dasgupta (Jaypee)
Clinical aspect of Immunology by Gell & Coombs (Blackwell oxford)
General Microbiology by Stainer et al (Macmillan edu. ltd)
Microbiology, sixth edition by Prescott, Harley & Klein (McGraw-Hill)

@@@@@

T. Y. B. Sc.

BIOSCIENCE Semester VI

Paper - IV Medical Microbiology

Unit : I Bacterial diseases -I

- Air borne disease – Tuberculosis.
- Air borne disease – Pneumonia.
- Food & water borne disease - Cholera.
- Food & water borne disease - Enteric fever.

Unit : II Bacterial diseases - II

- STD - Syphilis, Gonorrhoea.
- Soil born disease – Tetanus.
- Zoonosis - Leptospirosis
- Diarrheal disease.

Unit : III Nosocomial infection & Fungal diseases.

- Introduction to nosocomial infection
- Outline study of, sore throat & UTI.
- Candidiasis.
- Superficial dermatomycosis.

Unit : IV Viral diseases.

- Polio & Rabies.
- Mumps & chicken pox.
- Hepatitis – Hepatitis A & B.
- AIDS.

REFERENCES:

Medical Microbiology by Dey & Dey (Allied agency)
Review of Medical Microbiology by Jawetz & Melnick (Lange)
Text book of Medical Microbiology by Anantnarayan
Microbiology, sixth edition by Prescott, Harley & Klein (McGraw-Hill)

@@@@@

T. Y. B. Sc.

BIOSCIENCE Semester VI

Paper - V Parasitology & Clinical Microbiology

Unit : I. Parasitology

- Introduction to parasitology
- Amoebiasis
- Giardiasis & Balantidiasis
- Malaria.

Unit : II Helminthology

- Introduction to helminthology.
- Tape worm infection – Taeniasis.
- Ascariasis & Hookworm infection,
- Filariasis, Threadworm infection & Pin worm infection.

Unit : III Clinical Microbiology - I

- Introduction to clinical microbiology
- Collection & aseptic handling of clinical specimen.
- Transport of clinical specimen.
- Microbiological examination of sample.

Unit : IV Clinical Microbiology – II

- Chemotherapeutic agent, types, mode of action
- Microbial susceptibility testing.
- Antimicrobial sensitivity test, Paper disc method
- MIC, MBC, Tube dilution test.

REFERENCES:

Medical Parasitology by Chaterjee
Text book of Parasitology by Dey & Dey (Allied agency)
Text book of Medical Microbiology by Anantnarayan
District Laboratory Practice in Tropical Countries Part – I & II by Monika
Cheesbraugh (Cambridge)
Medical Microbiology by Dey & Dey (Allied agency)
Review of Medical Microbiology by Jawetz & Melnick (Lange)

@@@@@

T. Y. B. Sc.

BIOSCIENCE Semester VI

Paper - VI Applied Microbiology

Unit : I Microbiology of water & waste water.

- Introduction, sources of water.
- Purification of water, water quality & standard.
- Collection of water sample, fecal indicator.
- Microbiological analysis of water. (SPC, MPN, DCT, membrane filter, PA - test, defined substrate)

Unit : II Unit : I Microbiology of water & waste water

- Introduction to sewage & BOD.
- Municipal waste water treatment.
- Anaerobic sludge digestion.
- Disposal of solid waste.

Unit : III Microbiology of Milk & Milk products.

- Introduction to milk, sources of contamination, pasteurization.
- Normal fermentation (curdling), Spoilage of milk.
- Microbiological analysis of milk. (SPC, DCT, MPN, and reduction test)
- Milk products – Cheese & fermented milk product.

Unit : IV Microbiology of Air & Food

- Control of microbes by physical (laminar air flow & UV)
- Control of microbes by chemical agents. (disinfectants)
- Introduction, Microbial flora of fresh food, Spoilage of food
- Food intoxication, Microbiological examination of food.

REFERENCES:

Applied Microbiology by Vinita Kale (Himalaya)
Food Microbiology by Frazier (Tata McGraw-Hill)
Food Microbiology by Adams
Dairy Microbiology by Mahanta
Fundamental of Dairy Microbiology by Prajapati (Ekta prakasan)
Microbiology, sixth edition by Prescott, Harley & Klein (McGraw-Hill)
Fundamental Microbiology by Frobisher (W. B. Saunder)
Microbiology, fifth edition by Pelzar, Chan & Kreig (Tata McGraw-Hill)

@@@@@

BIOSCIENCE

Medical Laboratory Science

T. Y. B. Sc. Bioscience Practical, Semester – VI

➤ Blood banking

Blood grouping (ABO & Rh), Cell &
Serum grouping,
Blood grouping by Tile method
Cross-matching (slide, albumin, AHG reagent)
Coomb's test

➤ Immunology

Widal slide agglutination test
A) Screening test for enteric fever
B) Identification of unknown culture
Rapid plasma reagin test
Rheumatoid arthritis test
Demonstration of gel precipitate.
Introduction to some advanced serological technique.
A) Demonstration of ELISA.
B) Immunochromatographic
C) immunodot

➤ Bacteriological analysis of water & wastewater.

Standard plate counts
Detection & enumeration of coliform (MPN & DCT)
Study of fecal indicator bacteria by membrane tech.
PA Test, Defined substrate test.
Bacteriological examination of sewage.

➤ Bacteriological analysis of milk & food.

Standard plate counts
Detection & enumeration of coliform (MPN & DCT)
Gradation of milk. (MBRT)
Isolation & identification of microorganism from curd

- Diagnostic medical problem : Blood / Urine / Stool & Wound/Abscess/ Purulent exudates.

Pure culture study of *Salmonella typhi*

Salmonella paratyphi A

Salmonella paratyphi B

Shigella dysenteriae

E. coli

P. aeruginosa

P. vulgaris

S. aureus

S. pyogenes

- Routine examination of stool & sputum.

- Antibiotic sensitivity testing.

Determination of MIC of antibiotics

Paper disc method & combi disc.

- Study of permanent slide & specimens as per theory.

- Introduction & operational technique of electrophoresis.

Preparation of buffer solution. (phosphate, tris-EDTA)

Electrophoresis of serum protein.

Electrophoresis of haemoglobin for SCA.

- Biochemistry & Molecular biology

Estimation of protein by Folin-lowery method.

Estimation of reducing sugar by Nelsen-Somogi method.

Determination of antibiotic resistant mutant by gradient plate method.

Isolation of inducible mutant by UV rays.

REFERENCES:

Experimental Microbiology, Vol. I & II by Rakesh Patel (Aaditya)

Microbiology of water & waste water by Gainy (Prentice-Hall)

Experimental Microbiology.....by K.R.Aneja

Practical hand book of microbiology by Goldman &green (CRC Press)

@@@@@