

BIOCHEM-V & VI SEMESTERS NEW SYLLABUS 2020-21

BIOCHEMISTRY - PAPER – V

HUMAN PHYSIOLOGY AND CLINICAL BIOCHEMISTRY

Periods: 60

Max. Marks: 100

UNIT- I: Blood and Cardiovascular physiology

- 1.1 Composition of blood
- 1.2 Transport of gases in blood (O₂ and CO₂).
- 1.3 Molecular mechanism of blood coagulation, anticoagulant and fibrinolytic systems.
- 1.4 Heart- structure of the heart, cardiac cycle,

UNIT-II: Gastrointestinal and Renal physiology

- 2.1 Digestion and absorption of carbohydrates, lipids and proteins.
- 2.2 Metabolic importance of liver.
- 2.3 Structure of Kidneys-Nephron.
- 2.4 Urine formation, normal and abnormal constituents of urine.

UNIT-III: Muscle and Neuronal physiology

- 3.1 Kinds of muscles and mechanism of muscle contraction.
- 3.2 Central Nervous system, Peripheral Nervous system.
- 3.3 CSF
- 3.4 Membrane potentials, Synaptic transmission, Neurotransmitters

UNIT-IV Clinical biochemistry

- 4.1 Plasma proteins in health and disease.
- 4.2 Disorders of blood coagulation – haemophilia, and thrombosis
- 4.3 Types of anaemias, polycythemia, haemoglobinopathies-sickle cell anemia.
- 4.4 Hypertension, congestive heart disease, atherosclerosis and myocardial infarction.
- 4.5 Involvement of enzymes in diagnostics of heart disease including aspartate transaminase, isoenzymes of creatinekinase and lactate dehydrogenase and troponin.

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UNIT- V CLINICAL BIOCHEMISTRY – II

- 5.1 Liver function tests- conjugated and total bilirubin in serum, albumin: globulin ratio,
- 5.2 Serum enzymes in liver diseases- SGPT, GGT and alkaline phosphatases.
- 5.3 Renal function tests- creatinine and urea clearance tests, phenol red test.
- 5.4 Acidosis and alkalosis. Glomerular nephritis, renal failure, dialysis and diuretics

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BIOCHEMISTRY PRACTICAL SYLLABUS FOR V SEMESTER

BIOCHEMISTRY - PAPER – V

HUMAN PHYSIOLOGY (PRACTICALS)

1. Haematology.
 - a. RBC and WBC counting
 - b. Differential leucocyte count.
 - c. Clotting time.
2. Separation of plasma proteins.
3. Urine analysis for albumin, sugars and ketone bodies.
4. Estimation of urinary creatinine.
5. Estimation of blood Glucose.
6. Estimation of serum total cholesterol
7. Histology of connective tissue, liver and/ brain permanent slides.
8. Case studies (Renal clearance, GFR, ECG).

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BIOCHEMISTRY SYLLABUS FOR V SEMESTER

BIOCHEMISTRY - PAPER – VI

IMMUNOLOGY, ENDOCRINOLOGY&NUTRITIONAL BIOCHEMISTRY

Periods:60

Max. Marks: 100

UNIT – I Overview and Cells and Organs of Immune system

- 1.1 Introduction to basic concepts in Immunology
- 1.2 Innate and adaptive immunity
- 1.3 Cells of immune system
- 1.4 Organs of immune system
- 1.5 Major histocompatibility complexes

UNIT – II Antigens and Antibodies &Immune system in Health and Disease

- 2.1 Basic properties of antigens, factors influencing immunogenicity
- 2.2 Haptens and adjuvents.
- 2.3 Structure of antibody,classes and functions of antibodies
- 2.4 Monoclonal antibodies
- 2.5 Classification and brief description of various types of hyper sensitivities
- 2.6 Introduction to concepts of autoimmunity and immunodeficiency
- 2.7 General introduction to Vaccines, Types of vaccines.

Unit – III Endocrinology-I

- 3.1 Organization of endocrine system.
- 3.2 Classification of hormones.
- 3.3 Mechanism of hormonal action, signal transduction pathways

Outlines of chemistry, physiological role and disorders of:

- 3.4 Pituitary hormones - GH, prolactin, TSH, LH, FSH, oxytocin and vasopressin

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Unit –IV Endocrinology II

Outlines of chemistry, physiological role and disorders of:

- 4.1 Hormones of pancreas
- 4.2 Thyroid, parathyroid hormones
- 4.3 Hormones of Adrenal glands
- 4.4 Introduction to Hormones of Gonads, placenta
- 4.5 Introduction of gastrointestinal hormones.

Unit –V Nutritional Biochemistry

- 5.1 Calorific values of foods and their determination by bomb calorimeter.
- 5.2 BMR and factors affecting it. Specific dynamic action of foods.
- 5.3 Energy requirements and recommended dietary allowance (RDA) for children, adults, pregnant and lactating women.
- 5.4 Sources of complete and incomplete proteins. Biological value of proteins.
- 5.5 Malnutrition- Kwashiorkor, Marasmus and PEM.
- 5.6 Vitamins- sources, structure, biochemical roles, deficiency disorders of water and fat soluble vitamins.
- 5.7 Diabetes. Obesity and starvation.

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BIOCHEMISTRY - PAPER – VI

IMMUNOLOGY&NUTRITION

Periods: 24Max. Marks: 50

1. Estimation of calcium by titrimetry
2. Estimation of iron by Wong's method.
3. Estimation of vitamin C by 2, 6 -dichlorophenol indophenol method.
4. Determination of iodine value of oil.
5. Determination of blood group and Rh typing.
6. Visualization of antigen antibody reactions (Ouchterlony technique).
7. HCG based pregnancy test.
8. Glucose tolerance test

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BIOCHEMISTRY SYLLABUS FOR VI SEMESTER

BIOCHEMISTRY - PAPER – VII-A

MICROBIOLOGY AND MOLECULAR BIOLOGY

Periods: 60

Max. Marks: 100

Unit- I: Microbiology

- 1.1 Introduction to brief history of microbiology. Classification of microorganisms--prokaryotic and eukaryotic microorganisms.
- 1.2 Isolation and cultivation of bacteria. Selective media and enriched media.
- 1.3 Bacterial growth curve and kinetics of growth. Gram's staining- Gram positive and Gram negative bacteria.
- 1.4 Structure and composition of viruses. Isolation and cultivation of bacterial plaques.
- 1.5 Lytic and lysogenic life cycle of λ phage.
- 1.6 Retro viruses- HIV.

UNIT- II: DNA Replication and Transcription

- 2.1 Nature and structure of the gene.
- 2.2 DNA replication- models of replication, Meselson-Stahl's experimental proof for semi-conservative model.
- 2.3 DNA polymerases I, II and III of E.coli, helicase, topoisomerases, primase, ligase.
- 2.4 Bidirectional replication model. Okazaki fragments, leading and lagging strands of DNA synthesis.
- 2.5 Inhibitors of DNA replication.
- 2.6 Transcription - RNA synthesis, RNA polymerases of prokaryotes. Promoters, Initiation- sigma factors and their recognition sites. Elongation- role of core enzyme Termination- rho dependent and rho-independent.

Unit- III Protein Synthesis and Regulation of Gene Expression

- 3.1 Introduction to protein synthesis- Genetic code, deciphering of genetic code
- 3.2 Nirenberg's and Khorana's experiments

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3.3 wobble hypothesis, degeneracy of genetic code.

3.4 Protein synthesis- activation of amino acids (aminoacyl t-RNA synthetases).

3.5 Ribosome structure. Initiation, elongation and termination of protein synthesis.

3.6 Post- translational modifications-

3.7 Inhibitors of protein synthesis.

3.8 Regulation of prokaryotic gene expression- induction and repression. Lac operon.

Unit-IV: Recombinant DNA Technology

4.1 Outlines of cloning strategies.

4.2 Tools of r-DNA technology: Enzymes- Restriction endonucleases,

4.3 ligase, phosphatases, reverse transcriptase, polynucleotide kinases, terminal transferases
nucleases-S₁ and RNAase H. Restriction mapping.

4.4 Cloning vectors- Plasmid, Expression vector - Host- E.coli.

4.5 Construction of C-DNA and Genomic libraries. Isolation and sequencing of cloned genes-
Colony hybridization, Nucleic acid hybridization.

Unit V –Applied Biochemistry

5.1 DNA sequencing- Maxam Gilbert and Sanger's methods.

5.2 Polymerase chain reaction- principle and applications.

5.3 Outlines of blotting techniques-Southern, Northern and Western.

5.4 Applications of gene cloning- production of insulin and human growth hormone, production
of Bt cotton and edible vaccines.

5.5 Introduction to Bioinformatics- definitions of proteomics and genomics. Gene bank, NCBI,
DDBJ, Swissprot, PDB. Sequence alignments- BLAST and FASTA.

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BIOCHEMISTRY PRACTICAL SYLLABUS FOR VI SEMESTER

BIOCHEMISTRY - PAPER – VII-A

MICROBIOLOGY AND MOLECULAR BIOLOGY

Periods: 24Max. Marks: 50

List of Experiments:

1. Preparation of culture media and sterilization methods.
 2. Isolation of pure cultures: (i) Streak plate method. (ii) Serial dilution method.
 3. Gram staining.
 4. Motility of bacteria by hanging drop method.
 5. Antibiotic sensitivity by paper disc method.
 6. Isolation of DNA from onion/liver/coconut endosperm.
 7. Estimation of DNA by diphenylamine method.
 8. Estimation of RNA by orcinol method..
 9. Sequence alignments of insulin/BSA with other proteins using BLAST and FASTA.
 10. Examination of milk quality by MBRT method.
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BIOCHEMISTRY - PAPER – VII (B)

CELL BIOLOGY& GENETICS

Periods: 60

Max. Marks: 100

Unit I - Ultra structure of eukaryotic cell.

Cell organelles- Nucleus, Golgi complex, Mitochondria, Chloroplast, endoplasmic reticulum, lysosomes, peroxisome, glyoxisomes and vacuoles.

Unit II -Genes and their variations:

Structure of gene, gene and environment, gene copies of prokaryotic and Eukaryotic chromosomes. Eukaryotic chromosome organization, histone proteins. Gene transfer in bacteria (Conjugation, transformation and transduction).

Unit III Mendel's Laws and Inheritance

Mendel experiments, Mendel's Laws and deviations: incomplete dominance and Co-dominance Penetration and pleiotropism, Recessive and Dominant epistatic gene interactions. Concept of multiple alleles.

Unit IV: Gene mutation

Spontaneous and induced- Point and Frame shift.
DNA Damage and DNA Repair- Excision repair and mismatch repair.

Unit: V

Cell cycle and Cell division, Apoptosis

Suggested Books:

BIOCHEM-V & VI SEMESTERS NEW SYLLABUS 2020-21

1. Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley & Sons.Inc.
2. Cooper, G.M. and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
3. Gardner, E.J., Simmons, M.J., Snustad, D.P. (2006). Principles of Genetics.VIII Edition John Wiley & Sons.
4. Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics.V Edition. John Wiley and Sons Inc.
5. Russell, P. J. (2009). Genetics- A Molecular Approach.III Edition. Benjamin Cummings.
6. Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. IX Edition. Introduction to Genetic Analysis, W. H. Freeman & Co.

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BIOCHEMISTRY PRACTICAL SYLLABUS FOR VI SEMESTER

BIOCHEMISTRY - PAPER – VII (B)

CELL BIOLOGY AND GENETICS

Periods: 45

Max. Marks: 50

1. Study of different phases of mitosis in onion root tips and meiosis in *Allium cepa* flower buds.
2. Karyotyping in *Allium* or *Drosophila*.
3. Determination of multiple allele frequencies of leaf scars in *Trifolium*.
4. Problems and assignments in Mendilian genetics.
5. Determination of linkage and calculation of recombination frequencies (maize/ *Drosophila*).
6. Induction of chromosomal aberrations by chemical mutagenesis in *Allium* (or any plant).
7. Isolation of auxotrophic mutants (plants or insects).
8. Repair of DNA by Photo activation of Photolyase in bacteria.
9. Mutation of bacteria by UV.
10. Chemical induced mutation in bacteria
11. Stages in Mitosis
12. Stages in Meiosis.

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AP STATE COUNCIL OF HIGHER EDUCATION

BIOCHEMISTRY SYLLABUS FOR VI SEMESTER

BIOCHEMISTRY - PAPER – VII (C)

BASIC MICROBIOLOGY

Hours 60

Marks 100

Unit –I: History of development of microbiology

- 1.1 Development of microbiology as a discipline, Spontaneous generation vs. biogenesis.
- 1.2 Contributions of Anton von Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister, Alexander Fleming.
- 1.3 Role of microorganisms in fermentation,
- 1.4 Germ theory of disease
- 1.5 Development of various microbiological techniques.
- 1.6 Establishment of fields of medical microbiology and immunology through the work of Paul Ehrlich, Elie Metchnikoff, Edward Jenner

Unit-II: Diversity of microbial world

- 2.1 Binomial Nomenclature
- 2.2 Whittaker's five kingdom and Carl Woese's three kingdom classification systems and their utility.
- 2.3 Difference between prokaryotic and eukaryotic microorganisms.
- 2.4 General characteristics of different groups: acellular microorganisms (Viruses, Viroids, Prions) and Cellular microorganisms (Bacteria, Algae, Fungi and Protozoa) with emphasis on distribution and occurrence and mode of reproduction.

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Unit-III: Viruses, Bacteria and Protozoa

3.1 An introduction to viruses with special reference to the structure and replication of the following: Poxvirus and Poliovirus

3.2. Bacterial Diseases- Cholera and Typhoid.

3.3 Viral diseases TMV and T4.

3.4 Protozoan Diseases- Amebiasis and Malaria.

Unit- IV: Algae

4.1 History of phycology.

4.2 General characteristics of algae: occurrence, thallus organization,

4.3 Algae cell ultra-structure, pigments, flagella, eyespot food reserves

4.4 Vegetative, asexual and sexual reproduction.

4.5 Applications of Algae in agriculture, industry, environment and food.

Unit- V: Fungi

5.1 General characteristics of fungi - habitat, distribution, nutritional requirements,

5.2 Fungal cell ultrastructure, thallus organization and aggregation, fungal wall structure and synthesis,

5.3 Asexual reproduction, sexual reproduction, heterokaryosis, heterothallism and parasexual mechanism.

5.4 Economic Importance of Fungi in Agriculture, environment, Industry, medicine, food, biodeterioration,

5.5 Mycotoxins

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BIOCHEMISTRY PRACTICAL SYLLABUS FOR VI SEMESTER BIOCHEMISTRY –ELECTIVE PAPER: VII-C

BASIC MICROBIOLOGY

Periods: 24

Max. Marks: 50

List of Experiments:

1. Microbiology Laboratory Practices and Biosafety.
2. To study the principle and applications of important instruments (biological safety cabinets, autoclave, incubator, BOD incubator, hot air oven, light microscope, pH meter)
3. Preparation and sterilization of culture media for bacterial cultivation
4. Study of different shapes of bacteria, fungi, algae, protozoa using permanent slides/pictographs
5. Staining of bacteria using Gram stain
6. Isolation of pure cultures of bacteria by streaking method.
7. Estimation of CFU count.

SUGGESTED READINGS

1. Atlas RM. (1997). Principles of Microbiology. 2nd edition. W M.T. Brown Publishers.
2. Pelczar MJ, Chan ECS and Krieg NR. (1993). Microbiology. 5th edition. McGraw Hill Book company

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AP STATE COUNCIL OF HIGHER EDUCATION BIOCHEMISTRY SYLLABUS FOR VI SEMESTER

Biochemistry Cluster Elective Paper: VIII-A-1

HAEMATOLOGY

Hours 60

Marks 100

Unit – I: Laboratory Preparation in Haematology:

Introduction to

practical, Basic requirements. Collection of blood. Anticoagulants and effects of anticoagulants on blood cell morphology. Effects of storage of blood.

Unit – II: Routine Haematology:

Composition

of blood. Haemoglobin synthesis. Various haemoglobins. Haemopoietic system of the body. Blood cell counts. Erythropoiesis. Leucopoiesis and development of blood corpuscles. Thrombopoiesis. Laboratory technique of haemocytometry. Clinical significance of Total erythrocyte count, total leucocyte count, differential count, erythrocyte sedimentation rate and platelet count.

Unit – III: Haemostasis and Haematological Diseases:

General consideration of blood coagulation. Mechanism of coagulation. The fibrinolytic mechanism. Clinical significance of routine coagulation tests. Anaemia, Various types of anaemias – Iron deficiency anaemia, Aplastic anaemia, Pernicious anaemia, Sideroblastic anaemia and Sickle cell anaemia, Other haematological diseases – HDNB, Thalassaemia, Leukaemia. Parasitic infections of blood – structure and life cycle of Plasmodium vivax, types of malaria, Structure and life cycle of Wuchereria bancrofti.

Unit- IV: Automation in Haematology:

General considerations. Blood cell counters, Flow through cytochemical differential counter. Automated coagulated systems.

Unit - V: Immunohaematology and Blood banking:

Human blood Group systems. Inheritance of blood group systems. Blood transfusion.

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SUGGESTED READINGS

-) Park, K. (2007), Preventive and Social Medicine, B.B. Publishers
-) Godkar P.B. and Godkar D.P. Textbook of Medical Laboratory Technology, II Edition, Bhalani Publishing House
-) Cheesbrough M., A Laboratory Manual for Rural Tropical Hospitals, A Basis for Training Courses
-) Guyton A.C. and Hall J.E. Textbook of Medical Physiology.
-) Robbins and Cortan, Pathologic Basis of Disease, VIII Edition.
-) Prakash, G. (2012), Lab Manual on Blood Analysis and Medical Diagnostics, S. Chand and Co. Ltd.

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AP STATE COUNCIL OF HIGHER EDUCATION

w.e.f. 2015-16 (Revised in April, 2016)

BIOCHEMISTRY SYLLABUS FOR VI SEMESTER

Biochemistry Cluster Elective Paper: VIII-A-2

CLINICAL MICROBIOLOGY

Hours 60

Marks 100

Unit – I: Introduction to Clinical Microbiology:

Introduction to microbiology. Introduction to bacteriology. Classification of bacteria. Basic features of bacteria. Factors influencing the growth of bacteria. Morphology of bacteria. Normal bacterial flora of the body. Pathogenic microorganisms.

Unit – II: Clinical Bacteriology Laboratory & Staining methods:

Requirements of a microbiological lab — safe disposal strategies. Safety practices to be followed in a microbiological laboratory. Sterilization and disinfection. Requirements in a microbiological lab. Microscopy. Automation in Bacteriology. Introduction to Staining. Gram Staining. Acid-Fast Staining. Capsule Staining. Transfer of bacteria.

Unit – III: Culturing of Microorganisms and Identification of Bacteria:

Composition of culture media. Different types of culture media. Preparation of culture media. Inoculation of culture media. Culturing of anaerobes and different types of culture media used. Use, preparation and quality control of various culture media. Identification of bacteria — staining reactions, cultural characteristics and biochemical properties. Study of Gram Negative Bacteria — Bacilli and Cocci. Study of Gram Positive Bacteria — Gram positive Cocci, Anaerobic bacteria, study of genus — Bacillus and Corynebacterium. Study of Mycobacteria, Spirochetes and Rickettsia. Basic sterilization principles - autoclaving.

Unit- IV: Clinical Mycology and Virology:

Basic morphological classification of clinically important fungi. Parasitic fungi — Superficial Mycoses and Dermatophytes, Subcutaneous Mycoses, Intermediate Superficial Deep Mycoses and Deep or Systemic mycoses. Classification based on symptomatology. Some important

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viruses and related diseases (Measles viruses, Influenza viruses, Rotaviruses, Polioviruses, Herpes viruses, Rabies viruses, Hepatitis viruses. . General transmission routes for viruses.

Unit - V: Diagnostic Serology:

General view of immune system. Antibodies. Harmful effect of immunity. Autoimmune diseases. Principles of Serodiagnostic tests - Flocculation test, Agglutination test, Slide agglutination test, Tube agglutination test, Complement test, Micro titration test, Precipitin test and ELISA.

SUGGESTED READINGS

-) Park, K. (2007), Preventive and Social Medicine, B.B. Publishers
-) Godkar P.B. and Godkar D.P. Textbook of Medical Laboratory Technology, II Edition, Bhalani Publishing House
-) Cheesbrough M., A Laboratory Manual for Rural Tropical Hospitals, A Basis for Training Courses
-) Guyton A.C. and Hall J.E. Textbook of Medical Physiology.
-) Robbins and Cortan, Pathologic Basis of Disease, VIII Edition.
-) Prakash, G. (2012), Lab Manual on Blood Analysis and Medical Diagnostics, S. Chand and Co. Ltd.

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IOCHEMISTRY SYLLABUS FOR VI SEMESTER BiochemistryCluster Elective Paper:

VIII-A-3

BIOCHEMICAL CORRELATIONS IN DISEASES

Hours 60

Marks 100

Unit- I: Inborn errors of metabolism

Alkaptonuria, Phenylketonuria, Glycogen and Lipid storage diseases, SCID,
Diseases caused due to misfolded proteins: Alzheimer's, Huntington's disease, Kuru,
Creutzfeldt-Jakob disease,

Unit- II: Nutritional Deficiency and Life style diseases

Kwashiorkor, Marasmus. Beri-beri, Scurvy, Pellagra. Night blindness. Rickets,
Osteomalacia, Osteoporosis. Wilson's disease. Obesity. Cardiovascular diseases,
Atherosclerosis, Diabetes mellitus-II. Inflammatory Bowel Disease (IBD).

Unit- III: Hormonal Imbalances and Autoimmune diseases

Outline of hormone action and imbalances leading to disease - precocious puberty, hyper and
hypopituitarism. Hyper and hypothyroidism. Concepts in immune recognition - self and non
self- discrimination, organ specific autoimmune diseases – Hashimoto's thyroiditis, Grave's
disease, myasthenia gravis; Systemic diseases - SLE, rheumatoid arthritis; Diabetes Mellitus-I.

Unit- IV: Classification of infectious agents

Bacteria, Viruses, protozoa and fungi. Past and present emerging and re-emerging infectious
diseases and pathogens. Source, reservoir and transmission of pathogens, Antigenic shift and
antigenic drift. Host parasite relationship, types of infections associated with parasitic
organisms. Overview of viral and bacterial pathogenesis. Infection and evasion.

Unit- V: Infectious diseases

Viral infection (polio, measles, mumps, influenza, HIV) .

Bacterial infections (tetanus, diphtheria, tuberculosis, typhoid,
cholera). Protozoan (*Plasmodium* and *Trypanosoma*) and parasitic
infections.

Vaccines against diseases. General strategies in the design and development of vaccines.

CLUSTER ELECTIVE –VIII-A: VI SEMESTER

MEDICAL DIAGNOSTICS

PRACTICAL – 1 CLINICAL BIOCHEMISTRY

-] Collection of blood specimen and serum preparation.
-] Blood glucose and urine glucose estimation.
-] LFT, Kidney Function and Cardiac Profile tests.
-] Determination of serum proteins, SGOT, SGPT, S.ALP, S.ACP
-] Determination of sodium, potassium and chlorides

PRACTICAL – 2 HAEMATOLOGY& CLINICAL MICROBIOLOGY

-] Routine haematological tests – Blood smear preparation, TC, DC, ESR, Platelet count.
-] Determination of Haemoglobin.
-] Determination of PCV.
-] Determination of bleeding time.
-] Determination of blood clotting time.
-] Blood Grouping.
-] Preparation of nutrient agar, culture plates and isolation of bacteria on nutrient agar plate.
-] Study of permanent slides of *Candida albicans*, *Enterobactersps*, *Pseudomonas*, *Salmonella sps*, *Shigellasps*, *Staphylococcusaureus*, *Streptococcus pyogenes* and *Vibrio cholera*.
-] Staining methods – Albert's and Gram's staining methods.
-] Hepatitis test and Pregnancy test using ELISA
-] VDRL qualitative and quantitative test.
-] WIDAL slide agglutination and tube agglutination test.

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PRACTICA3: Biochemical Correlations in Diseases

(5 periods/week)

1. Glucose tolerance test.
2. Lipid profile: triglycerides and total cholesterol.
3. Obesity parameters.
4. RBC counting and haemoglobin estimation.
5. Blood pressure measurements.
6. Bone density measurements (visit to a nearby clinic).
7. T4 /TSH assays.
8. Tridot Test/ Lateral flow test for viral diseases

SUGGESTED READINGS

1. Textbook of Biochemistry with Clinical Correlations (2011) Devlin, T.M. John Wiley & Sons, Inc. (New York), ISBN: 978-0-4710-28173-4.
2. Immunology: A Short Course (2009) 6th ed., Coico, R and Sunshine, G., John Wiley & sons, Inc (New Jersey), ISBN: 978-0-470-08158-7
3. Biochemistry (2012) 7th ed., Berg, J.M., Tymoczko, J.L. and Stryer, L., W.H Freeman and Company (New York), ISBN: 13:978-1-4292-7635-1.
4. Genetics (2012) 6th ed., Snustad, D.P. and Simmons, M.J., John Wiley & Sons. (Singapore), ISBN:978-1-118-09242-2.

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