SRI KRISHNADEVARAY UNIVERSITY:: ANANTAPURAMU

UG CBCS SYLLABUS
VI Semester
(2017-2018)

B.Sc., BIO-CHEMISTRY

VI SEMESTER- SYLLABUS

(AS PER CBCS AND SEMESTER SYSTEM)

III YEARS

w.e.f. 2017-2018

AP STATE COUNCIL OF HIGHER EDUCATION
CBCS - PATTERN FOR BIO-CHEMISTRY

SRI KRISHNADEVARAYA UNIVERSITY:: ANANTAPURAMU

AP STATE COUNCIL OF HIGHER EDUCATION
B.Sc., BIOCHEMISTRY SYLLABUS FOR VI SEMESTER
BIOCHEMISTRY - PAPER – VII
MICROBIOLOGY AND MOLECULAR BIOLOGY

Periods: 60 **Max. Marks: 100**

Unit- I : Microbiology

Introduction to brief history of microbiology. Classification of microorganisms- prokaryotic and eukaryotic microorganisms. Isolation and cultivation of bacteria. Selective media and enriched media. Bacterial growth curve and kinetics of growth. Gram's staining- Gram positive and Gram negative bacteria, motility and sporulation.

Structure and composition of viruses. Isolation and cultivation of bacterial plaques. Lytic and lysogenic life cycle of λ phage. Retro viruses- HIV.

Unit II-Applied Biochemistry

Fermentation Technology: Batch, continuous culture techniques, principle types of fermentors. Industrial production of chemicals- alcohol, acids (citric acid), solvents (acetone), antibiotics (penicillin),

Enzyme Technology: Immobilization of enzymes and cells, different methods.Industrial applications.

Production of transgenic plants and their applications.

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

Unit- III : DNA Replication and Transcription

Nature and structure of the gene. DNA replication- models of replication, Meselson-Stahl's experimental proof for semi-conservative model. DNA polymerases I, II and III of *E.coli*, helicase, topoisomerases, primase, ligase. Bidirectional replication model. Okazaki fragments, leading and lagging strands of DNA synthesis. Inhibitors of DNA replication.

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- IV: Protein Synthesis and Regulation of Gene Expression

Introduction to protein synthesis- Genetic code, deciphering of genetic code, Nirenberg's and Khorana's experiments, wobble hypothesis, degeneracy of genetic code.

Protein synthesis- activation of amino acids (aminoacyl t-RNA synthetases). Ribosome structure. Initiation, elongation and termination of protein synthesis. Post- translational modifications- signal hypothesis. Inhibitors of protein synthesis.

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

Unit- V: Recombinant DNA technology

Outlines of cloning strategies. DNA sequencing- Maxam Gilbert and Sanger's methods. Tools of r-DNA technology: Enzymes- Restriction endonucleases, ligase, phosphatases, reverse transcriptase, polynucleotide kinases, terminal transferase nucleases-S_1 and RNAase H. Restriction mapping. Cloning vectors- Plasmid, Expression vector - Host- *E.coli*.

Construction of c-DNA and genomic libraries. Isolation and sequencing of cloned genes- colony hybridization, nucleic acid hybridization.

Polymerase chain reaction- principle and applications. Outlines of blotting techniques-Southern, Northern and Western.

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

BIOCHEMISTRY - PAPER – VII

PRACTICAL SYLLABUS :MICROBIOLOGY AND MOLECULAR BIOLOGY

Periods: 24 **Max. 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 CLUSTER SYALLABUS
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, Periniciousanaemia, Sideroblasticanaemia and Sickel 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 Wuchereriabancrofti.

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.

SUGGESTED READINGS

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

SRI KRISHNADEVARAYA UNIVERSITY:: ANANTAPURAMU
BIOCHEMISTRY CLUSTER SYALLABUS
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.Safetypractices 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, Spirocahetes 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 viruses and related diseases (Measles viruses, Influenza viruses, Rotaviruses, PoliovirusesHerpes 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.

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

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

Kwashiorkar, Marasmus.Beri-beri, Scurvy, Pellagra.Nightblindedness. Rickets, Osteomalacia, Osteoporosis.Wilson's disease.Obesity.Cardiovascular diseases, Atherosclerosis, Diabetes mellitus-II.Inflammatory BowelDisease (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 selfdiscrimination,
organ specific autoimmune diseases – Hashimoto's thyroiditis, Grave's disease,myastheniagravis;Systemic diseases - SLE, rheumatoid arthritis; Diabetes Mellitus-I.

Unit- IV : Diseases caused due to misfolded proteins

Alzheimer's, Huntington's disease, Kuru, Creutzfeldt-Jakob disease, Sickle cell anaemia, Thalessemia.

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.

BIOCHEMISTRY CLUSTER PRACTICAL SYALLABUS
PRACTICAL – 1 CLINICAL BIOCHEMISTRY

1. Collection of blood specimen and serum preparation.
2. Estimation of Blood glucose
3. Estimation of urine glucose estimation.
4. LFT, Kidney Function and Cardiac Profile tests.
5. Determination of serum proteins, SGOT, SGPT, S.ALP, S.ACP
6. Determination of sodium, potassium and chlorides

PRACTICAL – 2 HAEMATOLOGY& CLINICAL MICROBIOLOGY

1. Routine haematological tests – Blood smear preparation, TC, DC, ESR, Platelet count.
2. Determination of Haemoglobin.
3. Determination of PCV.
4. Determination of bleeding time.
5. Determination of blood clotting time.
6. Blood Grouping.
7. Preparation of nutrient agar, culture plates and isolation of bacteria on nutrient agar plate.

8. Study of permanent slides of *Candida albicans, Enterobactersps, Pseudomonas, Salmonella sps, Shigellasps, Staphylococcusaureus, Streptococcus pyogenes and Vibrio cholera.*
9. Staining methods – Albert's and Gram's staining methods.
10. Hepatitis test and Pregnancy test using ELISA
11. VDRL qualitative and quantitative test.
12. WIDAL slide agglutination and tube agglutination test.

PRACTICAL - III: PROJECT WORK

Associated with a Clinical Diagnostic Laboratory.