



**SRI KRISHNADEVARAYA UNIVERSITY::ANANTAPURAMU
DEPARTMENT OF BIOCHEMISTRY**

**Prof. C. Suresh Kumar Ph.D.
BOS, Chairman.**

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Mobile:9849669899**

No. SKU/Biochemistry Syllabus/ /2016.

Date: 11-02-2016

To

The Controller of Examinations,
S. K. University,
ANANTAPURAMU

Sir,

Sub:- M.Sc. Biochemistry Syllabus, Model Question Paper setting-Reg.
Ref: Your Letter No. SKU/PG Exams/Sending Syllabus/2016 Dated: 09-02-2016.

I am herewith sending M. Sc. Biochemistry II & IV Semesters Syllabus two sets, Panel of Question Paper Setters and Model Question Papers and open elective list for your consideration and necessary action. I request you to acknowledge the same .

Thanking you sir,

Yours Faithfully,

(C.SURESH KUMAR).
Chairman BOS

SRI KRISHNADEVARAYA UNIVERSITY::ANANTAPURAMU

DEPARTMENT OF BIOCHEMISTRY

Panel of external examiners for Paper setting Valuation Theory Examination II and IV Semesters, and Practical examinations, 2016 M.Sc. Biochemistry.

- | | |
|---|--|
| 1 Prof. Ch. Appa Rao
Dept. of Biochemistry,
S.V. University,
TIRUPATI. | 8. Prof. A. Sree Ramulu
Dept. of Biochemistry,
Gulbarga University
GULBARGA. |
| 2 Prof. K. Thyagaraju,
Dept. of Biochemistry,
S.V. University,
TIRUPATI | 9. Dr. M. Balaji
Dept. of Biochemistry,
S.V. University,
TIRUPATI. |
| 3 Prof. S.D. S. Murthy,
Dept. of Biochemistry,
S.V. University,
TIRUPATI. | 10. Dr. V. Ramakrishna
Dept. of Biotechnology
Yogi Vemana University
KADAPA |
| 4 Prof. O.V.S. Reddy.
Dept. of Biochemistry,
S.V. University,
TIRUPATI. | 11. Dr. M. Subba Rao
Dept. of Biochemistry
Acharya Nagarjuna University,
GUNTUR |
| 5 Prof. KPJ Hemalatha
Dept. of Biochemistry,
Andhra University,
VISAKHAPATNAM. | |
| 6 Prof. T. Raghava Rao
Dept. of Biochemistry,
Andhra University,
VISAKHAPATNAM. | |
| 7 Prof. K R S Sambhasiva Rao
Dept. of Biotechnology .
Acharya Nagarjuna University,
GUNTUR.. | |

SEMESTER II

BC 201: MOLECULAR BIOLOGY

CREDIT - I

Replication and Repair: Semi-conservative mode of replication, experimental evidence of Meselson- Stahl and Cairns autoradiography experiments. Replication fork, continuous and discontinuous DNA synthesis. Evidence for Okazaki fragments- RNA primers, Enzymes and protein in replication, Single Strand DNA binding proteins (SSB), Helicases, Topoisomerases, DNA ligases, DNA polymerases. E.coli DNA polymerase I, II and III, Eukaryotic DNA polymerases. Rolling circle replication. Replication of $\phi\times 174$ and E.coli DNA. Eukaryotic DNA replication. Autonomous replication sequences (ARS) and regulation of plasmid DNA replication. Mitochondrial DNA replication. Termination and fidelity of DNA replication. Nearest neighbour base pair analysis. Replicons and termination signals. Inhibitors of DNA replication. Reverse transcriptase. DNA damage and repair: Photo reactivation, direct reversal of damage, excision repair, Recombination repair. The SOS response.

CREDIT - II

Transcription: Polynucleotide phosphorylase - RNA polymerases, structure of E.coli -RNA Polymerase, eukaryotic RNA polymerases- Template binding, promoters and enhancer sequences. Initiation, elongation and termination of RNA synthesis. Monocistronic and polycistronic RNAs. Post-transcriptional modifications of different RNA molecules - Eukaryotic mRNA -capping, methylation and poly adenylation. RNA splicing. Splicing mechanisms. Splicing of nuclear pre- tRNA, Introns, group I and group II and pre-mRNA splicing. Excision of multiple Introns, catalytic RNA.

CREDIT - III

Translation (Protein synthesis):

The genetic code elucidation, experimental studies of Nirenburg and Khorona. General features of genetic code, codon degeneracy and universality. Mitochondrial genetic code, tRNA role in protein synthesis. Amino acyl-tRNA synthetases wobble hypothesis. Mechanism of initiation, elongation and termination of protein synthesis. Translational factors. Inhibitors of protein synthesis, antibiotics and other inhibitors. Post translational modifications. Protein sorting and targeting. The signal hypothesis, signal sequences and signal recognition particle, molecular chaperones, protein degradation, Lysosomal degradation. The ubiquitin pathway-protein stability and N-end rule.

Mutations: Mutagens, transitions, transversions, frame shift mutations, deletion, transposon, Mutagenesis, suppressor mutations.

CREDIT - IV

Regulation of gene expression: Housekeeping genes, constitutive genes, induction and repression. Regulatory proteins -DNA binding motif of regulatory proteins, role of Zinc fingers, leucine zippers, helix- turn -helix. Regulation of gene expression in prokaryotes operons, fine structure of lac operon, Regulatory protein. Repressors and the catabolic activator proteins, Negative regulation , Positive regulation, Dual functions of the repressor, the arabinose operon. Transcriptional control by attenuation, the trp and his operons. Regulation of gene expression in Eukaryotes - Eukaryotic promoters, positive regulation, gene amplification, gene rearrangement, translational control, hormonal regulation.- Homeotic genes and their regulation.

Recommended Books:

1. Molecular Biology of the Cell- B. Albert's, D. Bray, J. Lewis, M. Raff, K. Roberts and J.D.Watson (Garland Publishing, New York and London)
2. Molecular Biology - A Comprehensive Introduction to Prokaryotes and Eukaryotes-D. Freifelder (Jones and Bartlett, USA)
3. Recombinant DNA: A Short Course- J.D. Watson, J. Tooze and D.T.Kurtz (Scientific American Book, W.A.Premon).
4. Molecular cloning: Laboratory Manual - Maniatis, E.F. Fritsch and J. Sambrook (Cold Spring Harber Laboratory, New York). Nd
5. Modern Genetics (2nd Edition, 1984) - A.J. Ayala and W. Castra (Goom Helns, London).
6. Techniques in Molecular Biology (1992) -Ed., J. Walker and W. Castra (Geom Helns, London).
7. Practical Methods in Molecular Biology (1991) - R.F. Schecleif and P.C. Wensik (Springer Verlag).
8. Genes V. (1994) - Benjamin Lewin (Oxford University Press).

BC 202: CELL BIOLOGY AND HUMAN NUTRITION

CREDIT-I

Organization and Structure of Cells: Molecule - organelle - cell - organism, Oparin's chemical evolution. Cell structure and organization in bacteria, yeast, higher plant and animal cells: comparison of prokaryotic and eukaryotic cells. Organization, structure and functions of cell wall, plasma membrane, lysosomes, ribosomes, golgi complex, peroxisomes, glyoxysomes, mitochondria, plastids, endoplasmic reticulum, vacuoles, centrioles, cytoskeleton, composition and structure and function of microtubules, microfilaments and intermediate filaments.

CREDIT-II

Cell cycle: Bacterial cell cycle-karyokinesis and cytokinesis - Growth coordination - partition and cytokinesis, Eukaryotic cell cycle, different phases, Checkpoints, Molecular basis of cell cycle regulation. Cyclin dependent kinases, CDK-Cyclin diversity in yeast and animal cell cycles, regulation of CDK-Cyclin activity, progress through cell cycle - Apoptosis.

CREDIT-III

Bioenergetics: Thermodynamic principles - Chemical equilibria, free energy, enthalpy (H_0 entropy(S)). Free energy changes in biological transformations in living systems, High energy compounds. Energy change, oxidation-reduction reactions. Organization of electron carriers and enzymes in mitochondria. Classes of electron-transferring enzymes, inhibitors of electron transport. Oxidative phosphorylation. Mitochondrial transport system. Microsomal electron transport, photorespiration, cyclic and non-cyclic reactions, photo-chemical events associated with pigment system - I and II. Utilization of oxygen by oxygenases, superoxide dismutase and catalase.

CREDIT-IV

Composition of food, criteria of energy value, measurement of energy value of food - direct and indirect methods. RQ of foods and its significance. Basal metabolism and measurement of BMR. Factors affecting BMR. Specific dynamic action of foods, sources and physiological functions of carbohydrates, proteins, fats. Dietary fiber and its role. Complete and incomplete proteins. Essential fatty acids. Nitrogen balance, methods employed to evaluate nutritive value of dietary proteins.

Vitamins- fat and water soluble vitamins- structure, sources, daily allowances, physiological role, deficiency and toxicity symptoms, balanced diets and caloric requirements for people of various ages, sex and physiological state.

Minerals and essential ultra trace elements- calcium, copper, iron, iodine, zinc, cobalt, selenium, fluorine, manganese and molybdenum.

Reference Books:

1. Advanced Molecular Biology. Twyman RM and Wisden.
2. Molecular Biology of Cell. Alberts et al, Garland Science Publications
3. Biochemistry. Berg, Tymoc and Stryer, Freeman Publications.
4. Principles of Biochemistry - A.L.Lehninger(CBS Publishers).
5. Biochemistry- Lubert Stryer (5th Edition).
6. Principles of Biochemistry- General aspects - Smith et al., (8th edition).
7. Harper's Review of Biochemistry- Martin et al., (Lange).
8. Text Book of Biochemistry with clinical correlation- Thomas M.Devlin (John Wiley) 2ne & 4th Edition.
9. Text Book of Biochemistry -West et al., 1966 (MacMillian).
10. Biochemistry 2nd Ed. C.K.Mathews and K.E.Van Holde (1995) (Benjamins/Cummings).
11. Biochemistry 2nd Ed Donald Voet and J.G.Voet (1994) (John Wiley).

BC 203: Metabolism of carbohydrates and Lipids.

CREDIT-I

Catabolism, Anabolism - Glucose as fuel-Major and Minor metabolic pathways- Glycolysis- Importance of phosphorylated intermediates, Fates of pyruvate. Preparatory phase and payoff phase. Regulation of glycolysis. Fermentation. Metabolism of maltose, lactose, sucrose, fructose, mannose and galactose. Pentose phosphate pathway and its significance. Glucuronic acid pathway and ascorbic acid pathway.

CREDIT-II

TCA cycle: pyruvate dehydrogenase complex, Reactions of the TCA cycle and Regulation. Amphibolic pathway. Anapleotic reaction. The glyoxylate cycle. Gluconeogenesis and regulation. Futile cycles in carbohydrate metabolism. Glycogen metabolism and regulation. Biosynthesis of Starch, Biosynthesis of glycoproteins. CO₂ Fixation, C3 and C4 pathways (Hatch- Slack pathway). Disorders of carbohydrate metabolism- glycogen, lactose, galactose and fructose.

CREDIT -III

Lipid digestion, absorption and transport. Fatty acid oxidation- Fatty acid activation, Transport across the mitochondrial membrane. Oxidation: oxidation of unsaturated, odd-chain fatty acid, peroxisomal β -oxidation. Regulation of fatty acid oxidation α ,-oxidation and ω -oxidation. Degradation of triacylglycerol and phospholipids, ketone bodies-formation and utilization.

Biosynthesis of Fatty acids- Transfer of Mitochondrial acetyl Co-A to cytosol, formation of malonyl Co-A, Fatty acid synthase complex, biosynthesis and regulation of fatty acid synthesis.(Long chain fatty acids and unsaturated fatty acids) Biosynthesis of prostaglandins, Thromboxanes and Leukotrienes. Biosynthesis of Triacylglycerols and its regulation. Biosynthesis of glycerophospholipid sphingophospholipids and sphingoglycolipids. Sphingolipid storage disease Biosynthesis of cholesterol and its regulation, entry of cholesterol esters into cells. Fat of cholesterol.

CREDIT-IV

Lipoprotein metabolism. Chylomicrons-VLDL, LDL, HDL. Integration of carbohydrate and lipid metabolism. Role of liver and adipose tissue in lipid metabolism- fed & fast conditions. Metabolic integration, Compartmentation,

Recommended Books:

1. Principles of Biochemistry - A.L.Lehninger (CBS Publishers).
2. Biochemistry - Lubert Stryer (5th Edition).
3. Principles of Biochemistry - General aspects - Smith et al., (8th edition).
4. Harper's Review of Biochemistry - Martin et al., (Lange).
5. Text Book of Biochemistry with clinical correlation- Thomas M.Devlin (John Wiley) 2nd & 4th Edition.
6. Text Book of Biochemistry - West et al., 1966 (MacMillian).

7. Biochemistry 2nd Ed. C.K.Mathews and K.E.Van Holde (1995) (Benjamins/Cummings).
8. Biochemistry 2nd Ed Donald Voet and J.G.Voet (1994) (John Wiley).

BC 204: Open elective

Biomolecules and Instrumental methods:

CREDIT-I:

Introduction to Biochemistry. Biochemistry and evolution (outline only), axioms of living matter. Biomolecules (amino acids, proteins, Carbohydrates, lipids and nucleic acids) classification, chemical nature, structure and functions. Introduction to enzymes. Classification. Difference between chemical and biological catalysis. Factors affecting enzyme activity.

CREDIT-II:

Prokaryotic and Eukaryotic Cells, Sub-cellular Organisation. Important cell organelles and their functions. Cell types, structural hierarchy in cells. Introduction to membranes. Membrane organization and composition, Cell communication, cell division and cell cycle. Fundamental aspects of cell culturing.

CREDIT-III:

Concepts of anabolism, catabolism and regulation of metabolism. Intra-cellular compartmentation. Metabolism of Carbohydrates – Glycolysis, citric acid cycle, Gluconeogenesis, Glycogen metabolism. Metabolism of Lipids- Synthesis and degradation of fatty acids, TAG, Cholesterol. Metabolism of Amino acids- General aspects of glucogenic Ketogenic amino acids, Metabolism of ammonia- urea cycle. Metabolism of nucleotides- biosynthesis and degradation of purine and pyrimidine nucleotides. Disorders of purine metabolism

CREDIT-IV:

Introduction, principles and applications of UV-visible spectro photometry, NMR, Mass spectroscopy, Electrophoresis-PAGE, SDS-PAGE, Agarose gel. Centrifugation- General principles. Chromatography-Paper, TLC, Ion exchange, Affinity chromatography, gel filtration. Radio label isotopes.

Recommended Books:

1. Principles of Biochemistry - A.L.Lehninger (CBS Publishers).
2. Biochemistry - Lubert Stryer (5th Edition).
3. Principles of Biochemistry - General aspects - Smith et al., (8th edition).
4. Harper's Review of Biochemistry - Martin et al., (Lange).
5. Tools and techniques by TC Cooper
6. Biochemistry by U. Satyanarayana
7. Biophysical chemistry-Upadhyay-Upadhyay-nath

SEMESTER - IV

BC 401: CLINICAL BIOCHEMISTRY

CREDIT - I

Introduction and maintenance of Clinical Biochemistry laboratory - hazards, units of measurement, reference values - factors affecting reference values. Quality control in laboratory - use of external and internal standards with WHO standards. Selection and evaluation of methods. Automation in clinical laboratory, sources of biological variation. Collection and preservation of samples. Sampling methods.

Acid - base balance, Buffer systems, Role of lungs, red cells, kidney in regulating the pH of body fluids. Metabolic and respiratory acidosis and alkalosis, mixed acidosis. Compensation mechanism. Tests used to evaluate acid-base status of blood and their significance.

Glomerular and tubular functions. Test for evaluation. Measurement and significance of nonprotein nitrogen compounds. Estimation of glomerular filtration rate, Assessment of renal concentrating and diluting ability. Measurement of renal blood and plasma flow. Assessment of glomerular permeability. Renal tubular acidosis. Nephritis and nephrotic syndrome.

CREDIT -II

Functions of liver Metabolism of bilirubin - formation, transport, hepatic uptake and transport, conjugation, excretion, bacterial degradation. Bile acid metabolism and formation and secretion of bile, enterohepatic circulation.

Liver function tests related to bilirubin, protein, carbohydrates, lipid metabolism, detoxification, synthetic, excretory. Serum enzymes in liver disease. Jaundice - Classification, types, diagnosis and differential diagnosis.

Factors affecting enzyme levels in plasma or serum. Selection of enzyme tests. Techniques of enzyme assay. Measurement of isoenzymes and isoforms. Plasma enzymes in diagnosis and prognosis - aminotransferases, Creatine Kinase, LDH, alpha-amylase phosphatases, GGT, G6PDH, Cholinesterase, Isoenzymes of LDH and alkaline phosphatase. Clinical application of plasma enzymes in liver and muscle disease.

CREDIT -III

Cardiac markers - Isoenzymes of CK and LDH, Myoglobin, Cardiac troponin I and T. Clinical utility of cardiac markers in detection of acute myocardial infarction, minor myocardial injury, and in monitoring reperfusion following thrombolytic therapy.

Gastric function. Regulation of gastric secretion. Composition of gastric juice. Tests for gastric function - Fractional test meal, Histamine test meal, pentagastrin test, Insulin stimulation test. Gastric analysis. Significance of serum pepsinogen and gastrin.

Pancreatic exocrine secretions - Composition Tests in pancreatic disease - Directly following duodenal stimulation and by indirect procedures. malabsorption syndrome due to pancreatic and intestinal diseases and their investigation - Faecal fat, butter fat test meal, D-Xylose excretion test. Disaccharidase deficiency and their investigation.

Plasma proteins- Their variation in disease. Paraproteinemia, Proteinuria - Glomerular and tubular.

CREDIT - IV

Disorders of Carbohydrate Metabolism:

Importance and regulation of blood glucose level, Hypo and Hyperglycemia. Diabetes mellitus - Classification, etiology pathogenesis, clinical and laboratory features. Diagnosis of diabetes mellitus - GTT (oral and I.V.), random, fasting and postprandial blood glucose level, glycosuria, ketone bodies, glycolated Hb, plasma insulin, C-Peptide. Metabolic complication of Diabetes mellitus - hyperglycemia and nonketotic coma, hypoglycemia, Lactic acidosis, ketoacidosis, atherosclerosis, nephropathy.

Hypoglycemia - fasting and provoked. Stimulation test (I.V. glycogen and leucine test), extending GTT, Hypoglycemia in children - neonatal and early infancy.

Lipid metabolism:

Plasma lipids and lipoproteins and their functions and metabolism. Disorders of lipoprotein metabolisms. Diagnosis of lipoprotein disorders and management.

Porphyryne metabolism:

Porphyrinuria, porphyrias - Classification, types. Test based in the investigation of porphyrias.

Recommended Books:

1. Tietz Textbook of Clinical chemistry - Carl.A.Burtis, Edward R.Arnold (W.B. Saunders Co) 3rd Edition.
2. Varley's Practical Clinical Biochemistry - (Ed) Alan H. Gowenlock, J.R.McMurray, M.McLauchlan (Heinemann Medical Books). 6th Edition.
3. Clinical Biochemistry - Metabolic and Clinical Aspects - (Ed) W.J.Marshall & S.K. Bargert (Churchill Linigstorl)
4. Practical Clinical Biochemistry - Vol I and II - Harold Varleg. A.H. Gowenlock, M.Beh - (CBS Publication) 5th Edition.
5. Clinical Chemistry in Diagnosis and Treatment - Joan F. Zilva Dn P.R.Pannali (Lloyd - Luke) 2nd Edition.
6. Harper's Review of Biochemistry - Martin et al (Longman) 25th Edition.
7. Clinical Diagnosis and Management of Laboratory methods. J.B.Henr (Saunders) 23rd Edition.
8. Lecture notes on clinical biochemistry by Whitvy-Percyrob et al
9. Illustrated Biochemistry by Lippin Cots

BC 402: BIOSTATISTICS & BIOINFORMATICS

CREDIT - I

Brief description and tabulation of data and its graphical representation:

Collection of data - Classification, Tabulation, Diagrammatic representation of data. Measures of central tendency: Mean, median, mode, measures of dispersion - Range, interquartile Range. Average deviation, standard deviation, coefficient of variation. Correlation-Rank correlation, Regression lines, properties & examples.

CREDIT - II

Tests of significance - Types of errors, Level of significance, Power of the test, t-test, F-test, Chisquare test for testing of independence, ANOVA, one way classification, Two way classification, Examples.

CREDIT - III

Introduction to Bioinformatics: Various disciplines and applications of Bioinformatics-Databases, Genome analysis, functional genomics, proteomics, metabolomics, phylogenetics, structure prediction, drug design, pharmacogenomics.

Genome Projects: General introduction to genome projects. Human Genome Project (HGP) - Science behind HGP, facts at genome, chromosome and gene level. Benefits of HGP in medicine, agriculture, evolution, forensic science. Ethical Legal Social Implications (ELSI) of HGP- fairness in the use of genetic information, privacy and confidentiality, psychological impact and stigmatization. Genetic testing - standards, quality control and commercialization.

Biological Databases: General introduction, need of DB, database searching options- sequence alignment, gapped sequences, substitution matrices, filters. An overview of Public molecular DATABASES (EMBL, GenBank, DDBJ, GSDB) - Coding of database entries and database redundancy. Protein Databases-Introduction, main databases, international protein sequence database (PIR), SWISS-PROT database, TrEMBL, Brookhaven protein databank (PDB), PDB-SUM. Database querying (NCBI, EXPASY & EMB) using keywords and search engines.

CREDIT - IV

Organization of Biological Data: Introduction, Genomics, transcriptomics, proteomics.

Genomics: Functional genomics - DNA micro array technique (Design and analysis), Gene chip and SAGE technique. Accessing genome information from database- ensemble, TIGR genome resources, OMIM-NCBI. Annotating and analyzing whole genome sequence- E.coli, Arabidopsis, C.elegans and Homo sapiens. Proteomics: Introduction, principle, technique, 2-D database. Gel analysis software, post Gel analysis, MALDI-TOF, MS analysis. Significance and applications of proteomics in biology. Sequence Analysis: Concepts of sequence alignments and their importance. Sequence alignment methods and programs: BLAST - blastn, blastp, blastx, tblastx, basic blast options

Sequence Alignment: Introduction, significance of sequence alignments. Pair wise and multiple sequence alignment (MSA) using Clustal-X- creation and generation of MSA and PHY files. Phylogenetic tree construction and analysis using TREEVIEW.

Molecular Modeling & Drug Design: Structure of protein at primary, secondary, tertiary, quaternary level. Structure prediction methods- X-ray diffraction, NMR method, homology modeling. Homology modeling, Model-building tools (Modeller TM) - Preparation of alignment and template files and TOP files for model building, building of protein models. Building protein 3-D model with SwissPDB viewer, energy minimization. Molecular Visualization Packages: Rasmol - basic utilities and commands for protein visualization in 3D. Study of protein-DNA interactions, stereo mode, visualization of heteroatoms, HOH, metals, electron density maps, N and C terminals, disulfide bonds. Phases of drug development and drug design in genomic era.

References:

1. Primrose SB. Principles of Genome Analysis: a guide to mapping and sequencing DNA from different organisms. 2nd Ed. 1998. Blackwell Science: Oxford. ISBN 0-632-04983-9.
2. Genome Mapping: A practical approach. Dear P (Editor). 1st Ed. 1997. Oxford University Press: Oxford, New York
3. Developing Bioinformatics Skills. Alfonso Valencia and Blaschke. L (2002) Oreille's Publication.
4. Bioinformatics sequence, structure and data banks Ed. By Des Higgins Willie Taylor.

References on WEB

European Molecular Biology Laboratory (EMBL)

<http://www2.ebi.ac.uk/Help/General/general.html>

UK Human Genome Mapping Project - Resource Center (HGMP-RC)

<http://www.hgmp.mrc.ac.uk/>

SeqNet: UK Node of European Molecular Biology Network (EMBNNet)

<http://www.seqnet.dl.ac.uk/About/SEQNET/>

GenBank <http://www.ncbi.nlm.nih.gov/Genbank/>

DNA Databank of Japan (DDBJ) <http://www.ddbj.nig.ac.jp>

BC-403: ENDOCRINOLOGY

CREDIT - I

An account of cell signaling process (Autocrine, paracrine, Telecrine actions). Historical aspects of endocrinology, general characteristics and classification of hormones. Assay of hormones (bioassay, chemical assay, RIA, ELISA). Mechanism of action of steroid and peptide hormones. Molecular mechanism of signal transduction - nature and types of receptors, ligand-receptor interactions, Scatchard plot, up and down regulation of receptors, concept of second messengers with focus on cAMP, cGMP, Calcium, IP3 Nitric oxide. Mechanism of generation of second messengers and their action. Biological rhythms & biological clocks.

CREDIT - II

Hormones of Hypothalamus and Pituitary: Synthesis, storage, secretion, transport, mechanism of action and biological actions hypothalamic, adenohypophysial and neurohypophysial hormones. Hypothalamic and pituitary disorders. A brief account of structure and function of pheromones. Plant growth regulators. auxins, gibberellins and cytokinins. A brief account of insect hormones.

CREDIT - III

A detailed account of thyroid, parathyroid, adrenal medullary and cortical, pancreas (insulin, glucagon, and pancreatic polypeptide) and gut hormones, ANF (atrial natri uretic factor). Renin-angiotensin system and renal hormones. Disorders of thyroid, adrenal glands, prostaglandins. Hormones of thymus pineal glands and other peptide growth factors.

CREDIT - IV

Hormones of Gonads: Chemistry, Synthesis, storage, secretion and regulation, Physiological and biochemical aspects of hormones of Gonads, puberty and hormonal control of puberty, hormonal regulation of menstrual cycle. Oral contraceptives. Disorders associated with Gonadal hormones.

Recommended Books:

1. Harper's review of biochemistry - 25th edition by R.K.Murray et al., (Appleton and Lange).
2. Cell and Molecular Biology - Shieler and Bianchi.
3. Text book of Biochemistry with clinical correlations (eds.) T.M.Devlin (John Wiley).
4. Endocrinology by Mac.E.Hadley (Prentice Hall).
5. Tietz text book of clinical chemistry by Carl. A.Burtis and Edward R.Ashwood.
6. Essential endocrinology J.E.Wise (Oxford Press).

BC 404: IMMUNOLOGY

CREDIT - I

Introduction: Science of Immunology. Historical background of Immunology, Biological aspects of Immunity, Self and non-self recognition, specificity, memory of immune system. Cells of immune system, stem cell, megakaryocyte, lymphoid cell, myeloid cell, erythroid cell, granulocytes, agranulocytes, T-cell and B-cells.

Antigens: Essential features of Ag, Haptens, Carrier molecule, Cross reactivity. Immunization protocols - Selection of experimental animals, route of immunization, test bleeding, preparation of antiserum and its storage. Role of adjuvant in immunizations, Freund's complete and incomplete adjuvants.

Antibodies: Nature, primary structure of immunoglobulin, light chain, heavy chain, variable region, constant region, Hinge region, enzymatic fragmentation of Ig. Domain structure of Ig and significance. Classification of Ig: Types - IgG, IgM, IgA, IgD and IgE (origin, structure and functions).

Theories of Ab formation: Instructive, selective, clonal selection, theories and evidences, Immunological memory. Antibody diversity theories - Introduction, assembly and rearrangement of polypeptide chains in Ig. Light chain formation, V-J joining, Heavy chain formation, V-D-J- joining. Diversity theories: Mini gene theory, Mutation theory, Germ line theory.

CREDIT – II

Immunity: Types: Active and passive immunity. Cell mediated immunity, humeral immunity, Factors involved in T-cell and B-Cell activation. Immune response-Primary immune response and secondary immune response, immunological memory and principle of vaccination.

Natural resistance and nonspecific defense mechanism: Natural resistance-Species, racial, individual resistance, Non-specific defense mechanisms - Compliment activation, phagocytosis and mechanism of phagocytosis, Phagolysosome and respiratory burst. Natural killer cell and Interferon. Antiviral mechanism of gama interferon

Compliment pathway: Nature, cascade pathway, components of compliment pathway. Types: Classical pathway and alternative pathway. Classical pathway, intermediate steps, anaphylotoxis, immune adherence and immuno conglutinins. Regulation of C3b, formation of MAC, functions of compliment pathway.

CREDIT - III

Hypersensitivity (HS): General introduction, normal immune reactions, tissue protection and tissue damage, hyperactive immune reactions. Hypersensitivity state and reactions.

Classification of hypersensitivity reactions.

Type - I: General historical background of allergies. Prophylaxis reaction. Allergies and anaphylaxis - IgE, Mast cell degranulation, and biologically active agents released in Type I reactions, wheel and erythamatus reaction. Clinical manifestations and treatment of allergic reactions.

Type - II: Antibody mediated HS reactions, Mechanism, pathogenicity and cases of type II reactions, Hemolytic disease of new born (HDN).

Type - III: Immune complex mediated HS reactions: Mechanism & pathogenicity of type III reactions. Soluble immune complexes and insoluble immune complex mediated reactions. Arthus reaction. Farmer's lung, Librarian's lung, fox furriers disease, Serum sickness, nephritis.

Type-IV: Delayed type (or) cell-mediated HS reactions, Mechanism and pathogenicity, Tuberculin reaction, acute late graft rejection and Contact dermatitis.

Type - V: Stimulatory HS reactions. Mechanism and pathogenicity, T-cell stimulation, Grave's disease, Neonatal hypothyroidism.

Blood Groups: A,B,AB,O and Rh system, significance, practical applications of immuno Hematology in blood transfusions, maternal fatal incompatibility - Erythroblastosis foetalis.

Auto immunity and Immune suppression: Introduction, Auto recognition, classification of auto immune diseases, Hashimoto disease, thyrotoxicosis, myasthenia gravis, good pasture's syndrome, Systemic lupus erythematosis, Auto immune hemolytic anemia, Rheumatoid arthritis, male infertility, Ulcerative colitis, Thrombocytopenic purpura, Pernicious anemia.

Immune suppression: Types, General mechanism of immune suppression, lymphoid cell abolition, and immune suppressive drugs (azothioprine, methatrexate, cyclophosphamide, Cyclosporin-A, Steroids, lymphomodulins).

Transplantation: Terminology, Auto graft, Isograft, Allograft, Xenograft. Immunological basis of transplantation reactions, genetics of transplantation antigens, mechanism and types of rejections, GvH reaction. Prevention of graft rejection- cell ablation and ISD therapy.

CREDIT – IV

Immune Deficiencies: Introduction, primary and secondary deficiencies. T-cell, B-cell and combined immuno deficiencies, Compliment system deficiency. Acquired immuno deficiency syndrome. SCID.

Major Histocompatibility Complex (MHC): MHC in mice and HLA in man-fine structure and functions only.

Monoclonal antibody and Hybridoma technology: General Introduction, Polyclonal antibodies, significance of monoclonal antibodies. Hybridoma technology, General Immunization of animals, isolation of lymphocytes, Myeloma cell lines, fusion of myeloma cell with antibody producing B-cell. Fusion methods, selection and screening methods for positive hybrids with HAT selection, cloning methods. Production, purification and characterization of monoclonal antibodies. Engineering of monoclonal antibodies- chimeric mouse-human Mab, grafted CDRs, chimeric immunotoxin, hetero conjugate. Application of monoclonal antibodies in 31 biochemical research, in clinical diagnosis and treatment. Production of human monoclonal antibodies and their applications.

Immunological Techniques: Ag-Ab interactions, Precipitations and agglutinations. Lattice hypothesis. Precipitation reactions - Ring test, single diffusion test, two dimensional diffusion, single radial immuno diffusion (SRID). Immune Electrophoresis - counter current IE, cross over IE, rocket IE, 2 D- immune electrophoresis.

Agglutination tests- Haemagglutination reactions (ABO and Rh), Widal test, VDRL test, Agglutination inhibition test. Compliment fixation test - Principle technique and applications. Enzyme Immuno Assay: ELISA - Overview of enzyme immuno assays, principle and

methodology of ELISA - Sandwich ELISA and Indirect ELISA. Applications of ELISA in biology. \

Radio immuno assay - Radio labeled and unlabeled antigen. Principle and methodology of RIA. Applications of RIA. Doping test. IRMA (Immuno Radiometric Assay).

Recommended Books:

1. Essentials of Immunology - Ian & Roit - Blackwell Scientific Publications.
2. Fundamentals of immunology - William C. Boyed (Wiley Toppan).
3. Introduction to Immunology - John W. Kinball.
4. Fundamentals of Immunology - Otto S. View and others.
5. Immunology - D.M. Wier.
6. Immunology - Jains Kubay, (2001) Second Edition, W H Frecman & Company New York.



SRI KRISHNADEVARAYA UNIVERSITY, ANANTAPURAMU

Proforma for Preparation of Final List of PG Students for Open Elective Papers

Name of the Department: Biochemistry

Department Code (Examination):

Name of the Course: I-M. Sc (Semester: II)

**Code & Title of the open elective: RC26204- Bio-molecules and Instrumental methods #
Faculty of: Life Sciences**

S.No	Register Number	Name of the student	Department of the Student
1	152701005	D. Roopa	Biotechnology
2	152701006	D. Nazeer	Biotechnology
3	152701016	S. Sunil Kumar	Biotechnology
4	152801008	K.Annapurna	Botany
5	152801028	B.Devalatha	Botany
6	152801007	K.T.Preetham Naik	Botany
7	152801001	A.Veeranarayanamma	Botany
8	152901003	R.Aruna	Chemistry



**SRI KRISHNADEVARAYA UNIVERSITY::ANANTAPURAMU
DEPARTMENT OF BIOCHEMISTRY**

**Prof. C. Suresh Kumar Ph.D.
BOS, Chairman.**

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Office: 08555-255760
Mobile:9849669899**

No. SKU/Biochemistry Syllabus/ /2016.

Date: 11-02-2016

To

The Controller of Examinations,
S. K. University,
ANANTAPURAMU

Sir,

Sub:- M.Sc. Biochemistry Syllabus, Model Question Paper setting-Reg.
Ref: Your Letter No. SKU/PG Exams/Sending Syllabus/2016 Dated: 09-02-2016.

I am herewith sending afflicted Colleges M. Sc. Biochemistry II & IV Semesters Syllabus two sets, Panel of Question Paper Setters and Model Question Papers and open elective list for your consideration and necessary action. I request you to acknowledge the same .

Thanking you sir,

Yours Faithfully,

(C.SURESH KUMAR).
Chairman BOS