

## U.G. 2<sup>nd</sup> Semester

### Paper: BTN201C (Core) Biochemistry

Credits: 5 = 3+1+1 (48 Lectures)

#### Theory

Unit 1: Properties of water -physical and chemical, ionic product of water, acids and bases, buffers  
**3 hours**

Unit 2: Chemistry of biomolecules: occurrence, structure and classification of carbohydrates, amino acids and proteins, lipids and nucleic acids  
**12 hours**

Unit 3: Enzymes- classification, mechanism of enzyme action, factors influencing enzyme activity, enzyme kinetics, enzyme inhibition, regulation of enzyme activity (allosteric regulation); co enzymes and cofactors, isozymes, abzymes, ribozymes; isolation and purification of enzymes  
**8 hours**

Unit 4: Bioenergetics-I: overview of metabolism, high energy compounds, oxidation reduction reactions, glycolysis and pentose phosphate pathway, glycogen-breakdown and synthesis, gluconeogenesis, TCA, glyoxylate cycle  
**8 hours**

Unit 5: Bioenergetics-II: electron transport and oxidative phosphorylation; photosynthesis; fatty acid-biosynthesis and oxidation; urea cycle, nitrogen fixation  
**8 hours**

Unit 6: Vitamins- fat and water soluble vitamins, synthesis of vitamin A and D; dietary sources, deficiency diseases  
**4 hours**

Unit 7: Plant and animal hormones-types, biochemical aspects of hormone action  
**5 hours**

#### Practical

1. Preparation of buffers- acetate and phosphate
2. Qualitative estimation of carbohydrates
3. Qualitative estimation of amino acids and proteins
4. Estimation of total carbohydrate by Anthrone method
5. Estimation of total protein by Lowry's method.

#### Suggested Readings

1. Biochemistry - Berg. J. M, Tymoczko. JL and Stryer. L., WH Freeman, New York, 2002.
2. Biochemistry- Voet. D and.Voet. JG, John Wiley, New York, 2004.
3. Lehninger Principles of Biochemistry- Nelson. D. L and Cox. MM, W.H Freeman and Company, 2008.
4. Biochemistry- Zubay. G. L, Wm. C Brown Publishers, 1998.
5. Biochemical methods- Sadasivam. SK and Manikam. A, New Age International, 2005.
6. *Enzymes-Biochemistry, Biotechnology, Clinical Chemistry- Palmer.T and Bonner.P*, Woodhead Publishing Limited., 2007.
7. An introduction to practical biochemistry- Plummer, D. T., Tata McGraw- Hill, New Delhi.
8. Laboratory Manual in Biochemistry- Jayaraman, J, New Age International Publication.

**Paper Code – BTN202C (Core)**  
**Genetics**

**Credits: 4=3+1+1 (48 Lectures)**

**Theory**

Unit 1: Mendel's laws of inheritance, exceptions to Mendel's laws; allelic variation and gene function; epistatic interactions, multiple allele, penetrance, pleiotropism. **6 hours**

Unit 2: Linkage and crossing over- theories of linkage and crossing over, kinds of linkage, linkage groups, mechanisms of linkage and crossing over, significance of crossing over; sex determination – in animals and plants; Sex linked inheritance **8 hours**

Unit 3: Mutation: types, mechanisms, physical and chemical mutagens, effects of mutation; transposable elements **5 hours**

Unit 4: Cytoplasmic inheritance: plasmagenes, plastid inheritance in plants; sigma factor and extra-nuclear inheritance in *Drosophila*; kappa particle and cytoplasmic inheritance in *Paramecium* **4 hours**

Unit 5: Structural changes in chromosomes: deficiency, duplications, translocations, inversions- paracentric inversion, pericentric inversion, overlapping inversions **5 hours**

Unit 6: Numerical changes in chromosomes: aneuploidy-monosomy, nullisomy, trisomy tetrasomy, euploidy-monoploidy and haploidy, polyploidy- autopolyploids and allopolyploids **7 hours**

Unit 7: Population genetics-gene frequency, genotype frequency, gene pool; Hardy-Weinberg Equilibrium: disturbing factors, effect of linkage on equilibrium. **5 hours**

Unit 8: Developmental genetics: Genetic regulation of development- pattern formation and memory development: genesis of the body plan; homeotic selector genes and patterning of anteroposterior axis; organogenesis; cell movements and shaping of body; neural development. **8 hours**

**Practical**

1. Study of various stages of mitosis in plant materials.
2. Study of meiosis in plant materials.
3. Karyotype analysis in human
4. Study of chromosomal aberration in *Tradescantia/Rheo*
5. Induction of variation in chromosome number using chemical mutagens.

**Suggested Readings**

1. Genetics-Hartl D.L. and Jones, E.W, Jones and Bartlett Publisher, 2011.
2. Genetics –Strickberger, M.W., MacMill Publishing , January, 2008.
3. Genetics- Singh, B.D., Kalyani Publisher, 2013.
4. Genetics – Gupta, P.K., Rastogi publications, New Delhi, 2010.
5. Genetics- Singh, B.D., Kalyani Publishers, 2016.

**Paper Code – BTN203G (General Elective)**  
**Microbiology and Immunology**  
**Credits: 4=3+0+1 (48 Lectures)**

**Theory**

Unit 1: History and evolution of microbiology: diversity of microorganisms- archaea and bacteria, eukarya- algae, fungi, protozoa, *Mycoplasma*, *Rickettsia*, *Chlamydia*; structural organization of microorganisms. **5 hours**

Unit 2: Microscopy: light microscopy, phase contrast microscopy: basic working principles and applications **5 hours**

Unit 3: Transformation, transduction and conjugation in bacteria. viruses- classification, structure and replication; viroids, prions **4 hours**

Unit 4: Microbial nutrition, microbial media, microbial growth. **5 hours**

Unit 5: Major pathogenic microorganisms in plants, common causative organisms and human health. **8 hours**

Unit 6: Concept of immunity: acquired, innate, cell mediated and humoral immunity. Primary and secondary humoral responses. **6 hours**

Unit 7: Cells and organs of the immune system: lymphoid cells, mononuclear phagocytes, granulocytic cells, primary lymphoid organ, secondary lymphoid organ. **6 hours**

Unit 8: Concept of antigens and antibody: basic structure, types and functions **5 hours**

Unit 9: Agglutination and precipitation, RIA, ELISA. **4 hours**

**Practical**

1. Aseptic techniques: Glassware sterilization, preparation and sterilization of media
2. Isolation of pure cultures and culturing techniques.
3. Gram's staining of bacteria
4. Blood group determination
5. ELISA-demonstration

**Suggested Readings:**

1. Microbiology- Prescott, Harley and Klein; McGraw Hill Publications, 2008.
2. Principles of Microbiology-Atlas, R. M., McMillan Publishing House, 1998.

3. Microbiology: An introduction- Tortora, G.J., Funke, B.R. ,Case, C.L., Pearson Pub, 2015
5. Microbiology-Pelzer, Chan and Krieg, Tata McGraw Hill New Delhi, 2004.
6. Experiments in microbiology, plant pathology, tissue culture and mushroom cultivation: Aneja, K.R., New Age International, 2003.
7. Immunology- Kindt. T. J., Goldsby, R. A., Osborne, B. A. and Kuby, J. W. H. Freeman, 2007.
8. Essential Immunology- Roitt. I. V. and Delves, P. J., Blackwell Publishing company, 2004.
9. Immunology: Introductory text book- Shetty, N., New Age International Publishers, India.1998.