Unit 1

Nucleic acids as genetic information carriers- experimental evidence; Salient features of viral, prokaryotic and eukaryotic genomes. Basic concepts about the secondary structure of nucleic acids, base pairing and base stacking in DNA molecule. Tm and buoyant density and their relationship with G-C content in DNA. Structure and properties of RNA.

Unit 2

DNA replication in prokaryotes, semiconservative replication; DNA polymerases and other enzymes and protein factors involved in replication; Mechanism of replication in prokaryotes and its differences with eukaryotes. RNA polymerases, promoter, initiation, elongation and termination of RNA synthesis in prokaryotes and its differences with eukaryotes.

Unit 3

Reverse transcriptase; Eukaryotic post-transcriptional processing of RNA; Genetic code- triplet nature, degeneracy and universitility. Translation- mechanism in prokaryotes. Regulation of gene expression in Prokayotes- enzyme induction and repression, Operon concept (Lac operon and Trp operon).

Unit 4

Concept of immunity, innate and adaptive immunity. Lymphoid organs and cells of immune system. Antigen processing and presentation. Immunoglobulins- structure and functions; Antigens-Nature of antigens; Immunogens, Haptens. Forces involved antigen-antibody binding. Antibody- classes and mechanism of production. Differentiation of lymphocytes; clonal selection theory; Genetic basis of antibody diversity. Antigen-antibody reactions; Complement- system and its activation; Monoclonal antibody and its application.

Suggested readings

1. Molecular Biology of the Cell, Alberts B., Bray D, Lewis J., Ralf M., Roberts K. and Watson J.D., Garland Publishing Inc. (2001).
2. Immunology-Understanding the Immune System, Elgert KD, Wiley Liss, (2004).
3. Roitt's essential Immunology, Roitt IM and Delves PJ, Blackwell Science Ltd., (2006).
4. Molecular Biology of the Gene, Watson JD., Hopkins NH., Roberts JW., Steitz JA and Weiner AM (The Benjamin/Cummings Publ.Co.), (2008).
5. Molecular Cell Biology, Darnell J, Lodish H and Baltimore D, Scientific American Books, USA, (2010)

1. Isolation of nuclear DNA and quantitation.
2. Agarose Gel electrophoresis of nuclear DNA.
3. Determination of T_m.
4. Blood smears identification of leucocytes.
5. Determination of antigen-antibody specificity by immunodiffusion.
6. Blood grouping (ABO).

Suggested readings

1. Molecular Cloning: a laboratory manual, Sambrook J., Fritsch EF. and Maniatis T, Cold Spring harbor Laboratory Press, (2000).
2. Introduction to Practical Molecular Biology, DEabre P, John Wiley & Sons Ltd, (1998).
3. Basic and Clinical Immunology. Peakman M, and Vergani D. 2nd edition Churchill Livingstone Publishers, Edinberg. (2009).