Unit 1

Types and functions of animal tissues, Basic concepts of animal cell culture- primary cell culture and established cell lines; Embryonic Stem cell and Tissue stem cell concepts and its application. Tissue engineering. *In vitro* fertilization, growth factors promoting proliferation of animal cells

Unit 2

Transgenic animal and its application (concept of Dolly), problems and ethics in genetic engineering, Gene Therapy.

Unit 3

Scope and history of Plant Biotechnology; Plant Tissue Culture-tools and techniques, culture media, surface sterilization, callus and suspension cultures; Process of embryogenesis and organogenesis, different modes of plant regeneration; Anther and ovary culture for production of haploid plants, Micropropagation of elite species (axillary bud, shoot tip and meri-stem cultures).

Unit 4

Protoplast isolation, regeneration and fusion for development of Cybrids, Genetic fidelity of tissue culture raised plants. Use of molecular markers in selection of stable genotypes; Production of transgenic plants- direct and vector mediated gene transfer methods, Genetically modified organisms- success stories –Bt Cotton; Intellectual property rights (IPR) and related issues.

Suggested readings

1. Culture of Animal Cells: A Manual of Basic Techniques (5th Edition): R Ian Freshney. Wiley-Liss, (2005).
2. Animal Cell Culture – Practical Approach, Ed . John R W Masters. Oxford Univ Press. (2004).
3. Cell Growth and Division: A Practical Approach, Ed. R Baserga. Oxford Univ Press . 1989
4. Molecular Cloning: a Laboratory Manual, J Sambrook, E F Fritsch and T Maniatis, Cold Spring Harbor Laboratory Press, New York, 2000.
5. DNA Cloning: a Practical Approach, D M Glover and B D Hames, IRL Press, Oxford 1995.
6. Plant Biotechnology: J. Hammond, P. McGarvey and V Yusibov (Eds):, Springer Verlag, 2000
7. Plant Cell and Tissue Culture for the Production of Food Ingredients: T-J, Fu, G. Singh, and W R Curtis (Eds.):, Kluwer Academic/Plenum Press. 1999.

1. Exposure to animal cell culture and its maintenance.
2. Preparation of culture media, initiation and maintenance of callus.
3. Micro propagation of ornamental plants by auxiliary buds proliferation.

Suggested readings

1. Culture of Animal Cells: A Manual of Basic Techniques (5th Edition): R Ian Freshney. Wiley-Liss, 2005
2. Animal Cell Culture – Practical Approach, Ed . John R W Masters. Oxford Univ Press. 2000.
3. Plant Cell and Tissue Culture for the Production of Food Ingredients: TJ Fu, G. Singh and W R Curtis (Eds.), Kluwer Academic/Plenum Press. 1999.

Paper VIII T Genomics, proteomics and computer application 75

Unit 1

Objectives and function of genome projects- Human and *Arabidopsis.* Concept of structural, physical and functional human genomics. Definition and role of STS in human genomics.

Unit 2

Introduction to proteomics – structural organization of the protein (primary, secondary, tertiary and quaternary). Protein structure function relationship.

Unit 3

Computers- Introduction to Operating systems (Windows, LINUX, Mac). Introduction of programming language (C, C++), algorithm and flow-chart. Data processing- Batch on-line, real-time (applications in industries and bioreactors); Internet applications, Concept of data mining and biological databases.

Unit 4

Classification of biological databases, Biological data formation. Applications of bioinformatics in various fields, application of bioinformatics at various cellular levels (genomics, transcriptomics and proteomics).

Suggested readings

1. Bioinformatics: A practical guide to the analysis of genes and proteins. Baxevanis A.D and Ovellette B.F.F., Wiley-Interscience, (2002).
2. Textbook of Bioctechnology Das H.K., Wiley Dreamtech India Pvt Ltd, (2004).
3. Principles of Genome analysis and genomics, Primrose SB, Twyman RM, Blackwell Science (2002).

1. Introduction to NCBI websites.
2. Introduction to biological Databases.
3. Visit to educational institutions/ biotech firms and submit the report.

Suggested readings

1. Bioinformatics: A practical guide to the analysis of genes and proteins. Baxevanis A.D and Ovellette B.F.F., Wiley-Interscience, (2002).
2. Textbook of Bioctechnology Das H.K., Wiley Dreamtech India Pvt Ltd, (2004).
3. Principles of Genome analysis and genomics, Primrose SB, Twyman RM, Blackwell Science (2002).