Syllabus Major III Theory DSE – (Table 3a) for BSc. (H) Biotechnology

Course Name - Biotechnology I

Course objective – Aim of the course is to provide knowledge of historical events that lead to development of Modern Biotechnology and further its technological gain, importance, and applications in different fields of life science.

Course outcomes – After successful completion of the course students able to understand

- What is biotechnology? And its development
- Carbohydrates structure and functions
- Techniques involved in the field of Animal and Plant tissue culture
- Applications of Biotechnology in different area of life sciences

UNIT 1 - Cell as a basic unit of living system, prokaryotic and eukaryotic cell, Cell theory, History and types of Biotechnology, Classical and modern biotechnology, biotechnology based on colors, Scope and aim of Biotechnology
UNIT 1I: Classification of Carbohydrates.
Important Monosaccharides and their sources. Structure of glucose, fructose, mannose, galactose
Important oligosaccharides and their sources. Structure of lactose, Maltose, Isomaltose, Trehalose, Cellobiose. Sucrose.
Important Polysaccharides and their sources.
Homopolysaccharides. Starch, cellulose, chitin, pectin, hemicelluloses, xylan.
Structure of glycogen, starch and cellulose.
Heteropolysaccharides. Hyaluronic acid, chondroitin, Heparin, Agra-Agar.
Isomerism. Structural and sterioisomers- optical, geometric. Mutarotation, Enantiomers, epimers, and Diasterioisomers. Anomers.
UNIT III - Recombinant DNA Technology: General concept and Application, Strategies of recombinant DNA technology, Cloning Vector, Restriction Enzymes: Endonuclease (Types, Nomenclature) Star Activity, Isoschizomers, Palindromic sequences and Cleavage Pattern, sticky and Blunt ends, DNA Ligases
Unit IV- Animal and Plant Tissue Culture: Methods of sterilization, Wet heat, Dry heat, Irradiation, Chemical and Filtration etc, Types of basal media, Constituents of basal media, Serum - its advantages & disadvantages, Establishment of primary cell culture from various sources. Methods of plant micro-propagation. Plant tissue culture techniques. Media for plant tissue culture, Anther, Ovary and Embryo culture Axillary bud, shoot tip and meristem culture, Gene transfer methods.
UNIT V –Transgenic animals and plants, Fermentation basics, Bioreactors and its types, basics of Environmental biotechnology- Bioremediation, Bioleaching, Biofertilizers, Biogas, Biodiesel, Applications and Products of Biotechnology
References:

1. Nelson and Cox , Principles of Biochemistry, Fourth Edition
2. Todd and Howards Mason , Text book of Biochemistry, Fourth Edition
3. Gereld Karp - Dell and molecular biology, 4th Edition
4. B.D. Singh – Biotechnology, Expanding Horizons, Kalyani Publication.
5. P.K. Gupta – Biotechnology and Genomics, Rastogi Publication.
6. U. Satyanarayan, Biotechnology.