DEPARTMENT OF BIOTECHNOLGY
GOVT. DEGREE COLLEGE BARAMULLA

SEMESTER 2nd (NEP) MAJOR/MINOR COURSE

SUBJECT: BIOTECHNOLOGY

Title: (CELL BIOLOGY, MICROBIOLOGY AND IMMUNOLOGY)

Code: BBT22C201

CREDIT: (4+2) THEORY: 04; PRACTICAL: 02 CONTACT HOURS: 64 (T) + 64 (L)

Objective: This course is aimed to introduce students about the creation of life through cellular processes.

Expected Learning Outcomes:

1. *Understanding of basic differences between eukaryotic and prokaryotic cell system, structure-function relationships of different cell organelles.*
2. *Detailed understanding of bacteria/viruses and gene transfer methods in bacteria.*
3. *Description of different types of blood cells and organs involved in primary and secondary immune response.*
4. *Practical knowledge of different techniques/methods used in microbiology and immunology.*

Unit – 1: Cell Biology (16 hours)

Prokaryotic and eukaryotic cells; Structure and function of plasma membrane with special reference to membrane transport; Structure and function of cell organelles- Endoplasmic Reticulum, Golgi Apparatus, Mitochondria, plastids, Ribosome, Lysosome and Nucleus.

Unit – II: Microbiology (16 hours)

Introduction to microbiology - definition, basic features of prokaryotic and eukaryotic members of microbial world, Bacteria: classification based on Gram staining; Structure and function of bacterial cell wall, flagella. Gene transfer in bacteria - transformation, conjugation and transduction. Microbial growth - growth kinetics, growth curve & its phases, measurement of microbial growth, factors affecting microbial growth.

Viruses: general structure and basis of viral classification.

Unit – III: Immunology I (16 hours)

Anatomical barrier to infections (mechanical, chemical and biological). Cellular barrier to infection. Phagocytosis, Respiratory burst & intracellular killing. Mechanism of inflammation, Cells of the immune system (B lymphocyte, T lymphocyte, NK cell, APCs,

Granulocytes), Acute phase proteins. Organs of the immune system - Primary (Bone marrow, Thymus), Secondary (Lymph node, Spleen, MALT); Basic concept of cytokines.

Unit – IV: Immunology II (16 hours)

Mechanism of Humoral and Cell mediated Immune response. Primary and secondary immune responses. Complement System pathways. Nature and properties of antigen, Structure, Types and function of Antibodies. Monoclonal antibodies, Antigen-Antibody interaction, Antigen Processing and Presentation: Structure and Function of MHC molecules. Vaccines- Active and Passive Immunization.

PRACTICAL (2 Credits)

1. Sterilization techniques for glassware and plastic ware.
2. Preparation of culture media for bacterial cultivation.
3. Culture Techniques: Streaking, Spreading etc.
4. Identification of bacteria through Gram staining
5. Separation of serum from blood
6. Total and differential Leukocyte count.
7. Total RBC count.
8. Blood grouping

BOOKS RECOMMENDED

1. *Molecular Biology of the Cell*: Alberts, B., Bray, D., Lewis, J., Raff, M., Roberts, K. and Watson, J.D. - Garland Publishing Inc. New York.
2. *Cell and Molecular Biology - Concepts and Experiments*: Karp, G. - John Wiley Inc. New York.
3. *Microbiology*: Prescott, L. M., Harley, J. P. and Klein, D. A. - McGraw-Hill.
4. *Microbiology*: Pelczar, M. J., Chan, E. C. S. and Krieg, N. R. - McGraw-Hill.
5. *Kuby Immunology*: Goldsby, R. A., Kindt, T. J., Osborne, B. A. and Kuby, J. - W.H. Freeman andCompany, New York.
6. *Roitt's Essential Immunology*: Peter J. Delves, Seamus J. Martin, Dennis Burton, Ivan Roitt -Wiley-Blackwell; 13th edition
7. *Instant Notes in Immunology:* PM Lydyard, A. Whelan, M W Franger. -Springer-Verlag New York Inc.

DEPARTMENT OF BIOTECHNOLGY
GOVT. DEGREE COLLEGE BARAMULLA

SEMESTER 2nd (NEP) **SKILL COURSE**

SUBJECT: BIOTECHNOLOGY

TITLE: FOOD, PHARMA AND BEVERAGE INDUSTRIES

Code: BTG222S CREDIT: (2+2) THEORY: 02; PRACTICAL: 02

CONTACT HOURS: 32 (T) + 32 (L)

Course Objective:

To introduce students to basic skills required in pharma industries

Learning Outcomes:

Student should be able to understand importance of pharmaceutical industry

Students should understand type of drugs and their effect on human health

Students should be able to understand the potential of pharmaceutical industry of India

Unit I: Introduction to Pharmaceutical industry

Introduction to pharmaceutical industry in India, Impact of pharmaceutical products on human health, Types of pharmaceutical industries with focus of complementary and alternative medicinal systems (AYUSH), Sources of Drugs, biological, mineral and marine, Overview of Top pharmaceutical manufacturers in India, Introduction to Vaccines with special focus on Serum Institute of India.

Unit II: Introduction to Pharmaceutical Products

Active pharmaceutical ingredients, Properties and function of: Antiseptics and disinfectants, Antibiotics, Cardiovascular drugs, anti allergic and anti histamine agents, local anesthetics, painkillers and NSAIDs. Pharmaceutical aids and agents: expectorants, emetics, antidotes, antioxidants, preservatives, diluents, excipents and colorants.

PRACTICALS

1. Preparation of Standard solutions
2. Preparation buffers
3. Blood grouping
4. Preparation of Aspirin
5. Antibiotic sensitivity test
6. Visit of a pharmaceutical company/CSIR lab.

Suggested Books

1. N.K. Jain Introduction to Pharmaceutics, CBS Publisher
2. "Pharmaceutical chemistry" by Ashutosh Kar
3. "Introduction to pharmaceutical industry" by Dr. V.V. Bhavsar
4. "Pharmaceuticals: A comprehensive study" by S.P.Vyas and R.K. Khar (published by Vallabh Prakashan)
5. "Pharmaceutical Science" by B.S. Grewal (published by S.Chand Publishing)
6. "Pharmaceutical chemistry" by S.Ravi (Published by Pearson Education)

DEPARTMENT OF BIOTECHNOLOGY
GOVERNMENT DEGREE COLLEGE BARAMULLA

SEMESTER 1st (NEP) **MULTIDISCIPLINARY COURSE**

SUBJECT: BIOTECHNOLOGY

TITLE: (INTRODUCTION TO BIOTECHNOLOGY AND HUMAN HEALTH)

Code: BBT22M103 **THEORY (3 CREDITS: 48 HOURS)**

Objective: *This open elective course is aimed to*

- *Introduce students to basic concepts of biotechnology,*
- *Describe application of biotechnology to agriculture, human and animal health*
- *Comprehend contributions of biotechnology to forensic sciences and biomedical fields, such as diagnostics, genomics and therapeutics*

Expected Learning Outcomes:

1. *Understanding of basic applications of biotechnology.*
2. *Understanding of some of the applications of biotechnology in agriculture.*
3. *Understanding of some of the applications of biotechnology in human health.*

Unit – 1: Introduction to Biotechnology (16 Hours)

Definition, Scope and Milestones in Biotechnology.
Traditional and Modern Biotechnology, Different branches of Biotechnology

Unit – 2: Applications of Biotechnology in Agriculture (16 hours)

Applications of biotechnology in Agriculture; Plant tissue culture, Concept of transgenic and GM crops (Bt cotton, Bt brinjal, golden rice); Increasing shelf life of fruits, Nutraceuticals and edible vaccines

Unit -3: Biotechnology in Human health and forensics (16 hours)

Introduction to vaccines; Use of Biotechnology in diagnosis, Gene therapy; Pre-natal diagnosis, genetic counseling; Forensic applications- Solving crimes of murder and rape

BOOKS RECOMMENDED

1. Biotechnology for Beginners: Reinhard Renneberg Academic Press Elsevier Inc.
2. Biotechnology Demystified: Sharon Walker
3. Biotechnology, Satyanarayana, Books & Allied Ltd.