Gujarat University

B.Sc. (Biotechnology) Integrated CBCS Syllabus (June 2011) Semester I and II

BTECH-101 The Living World (40 Hours)

Origin and evolution of life

History of Earth, Theories of origin of life, Millers experiment,
Cell Theory, Cell differentiation, Levels of organization
Nature of the earliest organisms, Evolution of Prokaryotes, Eukaryotes, Mitochondria and Chloroplast
Quest for extra-terrestrial life
Whittaker's five-kingdom classification

Plant Kingdom

General characters of plant, Body organization: Root, Stem and Leaves; Tissues: Dermal, Vascular and Ground
Growth: Primary, Secondary, Morphogenesis and Differentiation
Common types of plants: Primitive plants Bryophytes, Traditional plants, Vascular plants, Adaptation to land and response to environment
Outline of Kingdom *Plantae*

Animal Kingdom

General characters of animal, Animal evolution, Body organization: Systems, Organs, Tissues, Coordination, Energy requirements
Primitive and advanced marine animals, Adaptation to land, Exchange with Environment,
Outline of Kingdom *Animalia*

The Microbial World

Structure, General character, Reproduction, Classification and Economic importance of Fungi, Algae and Protozoa
Structure, Chemistry and Reproduction of viruses, General characters of Prion, Viroid and Virusoid
Extreme environments, Biodiversity therein

Reference

1. Elden D Enger, FC Ross and DB Bailey (2005) Concepts in Biology, (11th Edn), TMH
2. Recee JB, Urry LA, Cain ML Wasserman SA, Minorsky PV and RB Jackson (2010) Campbell Biology (9th Edn), Pearson
3. Lack Andrew and David Evans (2005) Plant Biology, (2nd Edn), BIOS Instant Notes, Taylor and Francis
4. Cowan K and KP Talaro (2009) Microbiology: A Systems Approach, (2nd Edn), McGraw-Hill
5. Purves William K, David Sadava, Gordon H. Orians, and H. Craig Heller (2006) Life: The Science of Biology, (7th Edn), Academic Internet

BTECH-102 Practical (40 Hours)

Practical The Living World (101)

1. Study of Laboratory Equipments
2. Preparation of Standard Solution and Buffers
3. Hanging-drop preparation and observation of motility
4. Microscopic observation of wet-mount preparation from fungi
5. Monochrome Staining of Yeasts
6. Estimation of reducing sugar by Cole's method

7. Colorimetric estimation of Protein using Biuret Reagent
8. Colorimetric estimation of Glucose using Glucose oxidase

BTECH-103 Biology of the Cell (40 Hours)

Structure of cell

Chemistry and Ultrastructure of Cell wall, Membrane, Flagella and Cilia
Organelles Mitochondria, Chloroplast, Golgi bodies, Peroxysome, Endoplasmic reticulum, Ribosome
Nature of Cytosol, Cytoskeleton structures
Cellular diversity at structural and compositional levels among Prokaryotes, Archeobacteria, and Eukaryotes (Plant, Animal and Fungi)

Cellular Metabolism

Oxidation-Reduction, Energy and Carbons source utilization, Electron transport chain and ATP generation
Metabolism: Anabolism, Catabolism, Respiration, Fermentation, Photosynthesis
Nutrient uptake Active transport, Passive transport, Facilitated diffusion, Group translocation
Enzymes: Properties, Mechanism of catalysis, Allosteric controls

Cell Division

Cell division, Phases, Mitosis and Meiosis
Growth and Tumour
Cell cycle, Senescence and Apoptosis

Cell Expression

Central dogma of Life, Concept of Gene, Transcription, Translation and expression
Operon model, Coordination of Metabolism at enzyme Activity and Synthesis levels
Cell communication: Signal molecules, Receptors, Junction, Plasmodesmata and Cell signalling

Reference

1. BIOTOL Series (1991) The Molecular Fabric of Cells (Biotechnology by Open Learning), Butterworth Heinmann
2. BIOTOL Series (1991) Infrastructure and Activities of Cell (Biotechnology by Open Learning), Butterworth Heinmann
3. BIOTOL Series (1992) Principles of Cell Energetics, (Biotechnology by Open Learning), Butterworth Heinmann
4. Elden D Enger, FC Ross and DB Bailey (2005) Concepts in Biology, (11th Edn), TMH
5. Purves William K, David Sadava, Gordon H. Orians, and H. Craig Heller (2006) Life: The Science of Biology, (7th Edn), Academic Internet
6. Lodish Harve et al (2008) Molecular Cell Biology, (6th Edn), Freeman
7. Karp Gerald (2005) Cell and Molecular Biology – Concepts and Experiments, (4th Edn), Wiley
8. Robertiis EDP De and EMF De Robertis, Jr (2001) Cell and Molecular Biology (8th Edn), Lippincott William and Wilkins
9. Cassimeris Lynne, VR Lingappa and G Plopper (2011) Lewin's Cells (2nd Edn), Jones and Bartlett
10. Pollard Thomas D and WC Earnshaw (2008) Cell biology, (2nd Edn), Elsevier

BTECH-104 Practical (40 Hours)

Practical Biology of the Cell (103)

1. Aseptic handling and transfer of microorganisms
2. Differential staining by Gram stain
3. Nucleus Staining from human WBCs/ *Chiromonas*
4. Preparation of permanent slides showing stages of Mitosis (Onion) and Meiosis (Anther)
5. Human Karyotype staining and banding patterns
6. Counting of cell count and viability ratio by vital stain in Haemocytometer
7. Colorimetric estimation of DNA using Diphenylamine
8. Colorimetric estimation of RNA using Orcinol