**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**
3. Lack Andrew and David Evans (2005) Plant Biology, (2nd Edn), BIOS Instant Notes, Taylor and Francis

**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
9. Cassimeris Lynne, VR Lingappa and G Plopper (2011) Lewin’s Cells (2nd Edn), Jones and Bartlett

**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