

**OBJECTIVES:** To enable the students to –

- Understand the scope of Biotechnology.
- Know the principles of microscopy
- Understand the ultra structure of cells & cell division
- Understand the applications of statistics in Biology

**COURSE:**

**UNIT- I: INTRODUCTION**

1. Scope & Applications of Biotechnology
2. Microscopy :
  - i. Compound microscopy – Numerical aperture & it's importance, resolving power, oil – immersion objectives & their significance.
  - ii. Principles & Applications of Dark-field, phase – contrast, fluorescent microscopy.
  - iii. Electron microscopy – Principle, Ray diagram & applications of TEM & SEM, Comparison between optical and electron microscope.

**UNIT - II: PROKARYOTIC CELL**

1. Bacterial morphology – General morphology of bacteria: shapes and sizes. Generalized diagram of typical bacterial cell.
2. Slime layer & Capsule, Flagella, Pili & fimbriae.
3. Cell wall – Gram positive & Gram negative
4. Bacterial chromosomal organization, plasmids – Types of plasmids.
5. Endospores – Structure, formation germination, basis of resistance.

**UNIT - III: EUKARYOTIC CELL & CELL DIVISION**

1. Structure and functions of nucleus, nuclear membrane, nucleoplasm, nucleolus, golgi complex, mitochondria, chloroplast endoplasmic reticulum, lysosomes, peroxisomes, glyoxysomes and vacuoles.
2. Plant cell wall
3. Concept of cell cycle, cell division – mitosis & meiosis.

**UNIT - IV: MENDEL'S LAWS & INHERITANCE**

1. Mendel's experiments – factors contributing to success of Mendel's experiments.
2. Mendel's laws – Laws of segregation, Law of Dominance  
Law of independent assortment
3. Deviations from Mendel's laws – Incomplete & co-dominance.
4. Penetration & Pleiotropism
5. Recessive & Dominant epistatic gene interactions (9:3:4, 12:3:1, 13:3)
6. Concept of multiple alleles.

**UNIT - V: GENETIC INHERITANCE & BIOSTATISTICS**

1. Linkage, recombination frequency factors, gene maps, interference & coincidence.
2. Mitotic crossing over
3. Sex determination in Drosophila
4. Transposable elements- Types, Structure, Mechanism and Example – AC-DS elements in Maize.
5. **Biostatistics:** Types of Data, Collection of Data, Primary & Secondary data, Classification & graphical representation of statistical data. Measures of central tendency (Mean, Median & Mode) and Dispersion. Measures of skewness and kurtosis.

**REFERENCES:**

1. Cell and Molecular Biology – by De Robertis – Waverly Publication
2. Cell Biology and Genetics – by P.K.Gupta
3. Genetics – B.D.Singh 2003 – Kalyani Publication
4. Concepts of Genetics – Klug & Cummings 2003 – Pearson education, Delhi.
5. Genetics – strickberger.

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM  
I SEMESTER  
BTH 1751 (2)  
w.e.f. 2017 – 2020 ('17AE')

**BIOTECHNOLOGY**  
**CELL BIOLOGY & GENETICS**  
**PRACTICAL – I A**

Time: 3 Hrs/Week  
Marks: 50

I. Microscope – Different parts and their function

II. Methods in Cytology:

A. Cytological Preparation

Fixation, Dehydration and Staining

B. Squash Preparation - Mitosis (Onion Root Tip)

Meiosis (Onion / Maize flower bud)

Karyotype (Onion Root Tip)

III. Genetics & Biostatistics

A. Solving problems in

- Monohybrid ratio
- Dihybrid ratio
- Incomplete dominance
- Linkage & Crossing over

B. Problems on Mean, Median, Mode, Graphical representation of statistical data,  
Measures of dispersion.

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