

B.Sc. II (SEM IV)
4S- BOTANY
CELL BIOLOGY, GENETICS AND BIOCHEMISTRY

Unit – I: Cell Biology

- 1.1 Cell concept – Prokaryotic and Eukaryotic cell
- 1.2 Cell wall –Structure and Functions
- 1.3 Plasma membrane –Structure (models) and Functions
- 1.4 Nucleus – Ultra structure (nuclear membrane, nuclear pore complex and nucleolus) and functions
- 1.5 Chloroplast- Structure and Functions

Unit–II: Cell Biology Structure and functions of-

- 2.1 Endoplasmic Reticulum
- 2.2 Golgi complex
- 2.3 Vacuole
- 2.4 Ribosome
- 2.5 Peroxysome
- 2.6 Mitochondria
- 2.7 Cell cycle: Mitosis and Meiosis

Unit – III: Genetics

- 3.1 Chromosome- Morphology, Types, Centromere & Telomere
- 3.2 Chromosomal aberrations –
 - 3.2.1 Structural aberrations: Deletion, Duplication, Inversion and Translocation
 - 3.2.2 Numerical aberrations: Euploidy and aneuploidy

Unit–IV: Genetics

- 4.1 Mendellism: Mendel’s law of Dominance, Segregations and Independent assortment, Incomplete dominance
- 4.2 Interaction of genes- Complimentary, Supplementary and Epistasis
- 4.3 Problems based on Mendelism and Interaction of Genes

Unit – V Genetics

- 5.1 Linkage – Concept, Types and theories
- 5.2 Crossing over: Concept, Types and theories
- 5.3 Gene mutations- Spontaneous and Induced
- 5.4 Extra-nuclear Genome- Mitochondrial DNA and Chloroplast DNA

Unit – VI Biochemistry

- 6.1 Nomenclature of Enzymes
- 6.2 Characteristics of Enzymes
- 6.3 Concept of holoenzymes, coenzymes and cofactors
- 6.4 Theories for Mechanism of action of Enzymes
- 6.5 Structure and functions Carbohydrates:
Monosaccharides (Glucose), Disaccharides (Galactose) and Polysaccharides (Starch)

PRACTICAL:

I Cell Biology (Any Two)

- 1. Isolation of mitochondria from plants
- 2. Isolation of chloroplast
- 3. Squash preparation for the study of various stages of mitosis
- 4. Smear preparation for the study of various stages of meiosis.

II Genetics

- 1. To prove Mendel's Monohybrid ratio.
- 2. To prove Mendel's Dihybrid ratio.
- 3. Problems based on Interaction of genes

III Biochemistry

- 1. To study the enzyme activity of catalase.
- 2. To demonstrate test for glucose in grapes, & sucrose in cane sugar / beet root.
- 3. To demonstrate test for protein.
- 4. To demonstrate the lipid test in oily seeds.
- 5. To demonstrate the test for starch / cellulose.
- 6. To demonstrate the activity of enzyme amylase from germinating Wheat grains.

B. Sc. II: Semester – IV

Practical Schedule

Time: 4 hours Marks : 50

- Q.1: Squash/Smear preparation for study 10 Marks
of Mitosis/Meiosis stages
- Q.2: Genetics : To perform given experiment 10 Marks
- Q.3: Genetics problem 05 Marks
- Q.4: Biochemistry : To perform given test (Any Two) 10 Marks
- Q.5: Spotting 05 Marks
- Q.6 Class record and viva-voce 10 Marks

Suggested Readings :

- 1) **Ahluwalia K.B** 2005 (First Edition). Genetics. New Age International Private Ltd. Publishers, New Delhi.
- 2) **Buchanan B.B, Gruissem W. and Jones R.L** (2000). Biochemistry and Molecular Biology of Plants. American Society of Plant Physiologists Maryland, USA.
- 3) **Dalela & Verma** : Cytology.
- 4) **Darnell J.** 2000. Molecular Cell Biology (Fourth Edition). W.H. Freeman and Company, New USA.
- 5) **De-Robertis** EDP : Cell Biology.
- 6) **Devi P.** 2008-Principle and Methods of plant Molecular Biology, Biochemistry and Genetics Agrobios, Jodhpur, India.
- 7) **Gardner and Simmons Snustad** 2005 (Eighth Edition). Principles of Genetics, John Wiley and Sons, Singapore.
- 8) **Gerald Karp** 1999 Cell and Molecular Biology- Concept and Expts. John Wiley and Scene Ine., USA.
- 9) **Gupta P.K** (1995) Genetics and Cytogenetics. Rastogi Publications, Meerut.
- 10) **Leninger A.C** (1987). Principles of Biochemistry, CBS Publishers and Distributers (Indian Reprint)
- 11) **Lodish Etal** 2004 (Fifth Edition). Molecular Cell Biology, W H Freeman and company, New York.
- 12) **Moore T.C.** 1989. Biochemistry and Physiology of Plant Hormones Springer – Verlag, New York, USA.
- 13) **P.S.Verma & Agrawal V.K.** : T.B. of Cytology.
- 14) **Pawar C.B** 2003 (First Edition). Genetics Vol. I and II. Himalaya Publishing House, Mumbai.

- 15) Powar C.B** 2005 (Third Edition). Cell Biology, Himalaya Publishing, Mumbai.
- 16) Roy S.C and KKDe** 2005 (Second Edition). Cell Biology, New central Book Agency Private Ltd., Kolkata.
- 17) Sharma J.R** 1994 Principles and practices of Plant Breeding. Tata McGraw-Hill
- 18) Shrivastav H.N.** - Cell Biology and Genetics - New Millenium Edition - Pradip's.
- 19) Singh B.D** 2004. Genetics. Kalyani Publication, Ludhiana.
- 20) Strickberger** 2005. (Third Edition). Genetics. Prentice Hall of India Pvt. Ltd., New Delhi.
- 21) Veerbala Rastogi** : Introduction to cytology.
- 22) Verma P.S and Agarwal V.K** 2006 Cell Biology, Genetics, Molecular Biology, Evolution, Ecology. S.Chand and Company, New Delhi.
- 23) Verma P.S. and Agarwal V.K.**(1991), Genetics. S Chand Comp. Ltd. Ramnagar, New Delhi.
- 24) Verma S.K. and Mohit Verma** 2007. A.T.B of Plant Physiology, Biochemistry and Biotechnology, S.Chand Publications.
- 25) Verma S.K. and Verma Mohit** (2007). A.T.B of Plant Physiology, Biochemistry and Biotechnology, S.Chand Publications.
- 26) Modern Practical Botany, Volume-I, Dr.B.P.Pande, S.Chand Publication, New Delhi.
- 27) Modern Practical Botany, Volume-II, Dr.B.P.Pande, S.Chand Publication, New Delhi.
- 28) Modern Practical Botany, Volume-III, Dr.B.P.Pande, S.Chand Publication, New Delhi.