

Paper No: 9
SEMESTER - IV
CELL BIOLOGY

THEORY

MARKS: 100

Unit 1 Structure of Cell

No. of lectures: 12

- 1.1 Plasma membrane:** Structure and transport of small molecules
- 1.2 Cell Wall:** Eukaryotic cell wall
Extra cellular matrix and cell matrix interactions
Cell-Cell Interactions - adhesion junctions, tight junctions, gap junctions, and plasmodesmata (only structural aspects)
- 1.3 Mitochondria, chloroplasts and peroxisomes**
- 1.4 Cytoskeleton:** Structure and organization of actin filaments, association of actin filaments with plasma membrane, cell surface protrusions, intermediate filaments, microtubules

(Chapters 11, 12, 13 &14, The Cell : A Molecular Approach by Geoffrey. M. Cooper and Robert. E. Hausman, 5th Ed., Sinauer Associates, 2009, Pages: 433-444, 452-459, 464-468, 473,479-487, 496-511, 529-557, 571-596)

Unit 2 Nucleus

No. of lectures: 4

- 2.1 Nuclear envelope, nuclear pore complex and nuclear lamina**
- 2.2 Chromatin** – Molecular organization
- 2.3 Nucleolus**

(Chapter 9, The Cell : A Molecular Approach by Geoffrey. M. Cooper and Robert. E. Hausman. 5th Ed., Sinauer Associates, 2009, Pages: 355-361, 370-378)

Unit 3 Protein Sorting and Transport

No. of lectures: 12

- 3.1 Endoplasmic Reticulum** – Structure, targeting and insertion of proteins in the ER, protein folding, processing and quality control in ER, smooth ER and lipid synthesis, export of proteins and lipids
- 3.2 Golgi Apparatus** – Organization, protein glycosylation, protein sorting and export from Golgi Apparatus
- 3.3 Lysosomes**

(Chapter 10, The Cell: A Molecular Approach by Geoffrey. M. Cooper and Robert. E. Hausman. Fifth Edition Sinauer Associates, 2009, Pages : 383-407, 408-415, 423-428)

Unit 4 Cell Signalling

No. of lectures: 8

- 4.1 Signalling molecules and their receptors**
- 4.2 Function of cell surface receptors**
- 4.3 Pathways of intra-cellular receptors** – Cyclic AMP pathway, cyclic GMP and MAP kinase pathway

(Chapter 15, The Cell : A Molecular Approach by Geoffrey. M. Cooper and Robert. E. Hausman. Fifth Edition Sinauer Associates, 2009, Pages : 603-621, 622-624, 630-634)

Unit 5 Cell Cycle, Cell Death and Cell Renewal

No. of lectures: 12

- 5.1** Eukaryotic cell cycle and its regulation
- 5.2** Development of cancer, causes and types
- 5.3** Programmed cell death
- 5.4** Stem cells
- 5.5** Embryonic stem cell, induced pluripotent stem cells

(Chapters 16, 17, & 18, The Cell : A Molecular Approach by Geoffrey. M. Cooper and Robert. E. Hausman. 5th Ed., Sinauer Associates, 2009, Pages: 653-672, 725-734, 693-705, 705-714, 714-720)

PRACTICALS

MARKS: 50

1. To study structure of cell organelles through electron micrographs
2. Cytochemical staining of DNA – Feulgen
3. To demonstrate the presence of mitochondria in striated muscle cells/ cheek epithelial cell using vital stain Janus Green B
4. Study of polyploidy in Onion root tip by colchicine treatment
5. Identification and study of cancer cells by photomicrographs

SUGGESTED READING

1. Hardin J, Bertoni G and Kleinsmith LJ. (2010). Becker's World of the Cell. 8th edition. Pearson.
2. Karp G. (2010) Cell and Molecular Biology: Concepts and Experiments. 6th edition. John Wiley & Sons. Inc.
3. De Robertis, EDP and De Robertis EMF. (2006). Cell and Molecular Biology. 8th edition. Lipincott Williams and Wilkins, Philadelphia.

ONLINE READING MATERIAL

1. <http://www.ncsu.edu/sciencejunction/terminal/imse/lowres/1/cellbiology.htm>
2. <http://www.cellbio.com/>