Swami Ramanand Teerth Marathwada University, Nanded

SYLLABUS M.Sc. BIOTECHNOLOGY

CHOICE BASED CREDIT SYSTEM (June 2019)

Semester	Code	Title of the Course	Hr/Week	Type of Course	Credit	Marks		Total
						ESA	MSA	
I	BT-I	Cell and Developmental Biology	4	CC	4	75	25	100
	BT-II	Microbiology and Virology	4	CC	4	75	25	100
	BT-III	Biochemistry	4	CC	4	75	25	100
	BT-IV	(A) Techniques in Biotechnology (B) Plant Metabolism and Development	4	DSE	4	75	25	100
	Lab course-I	Practicals based on course BT-I and BT-II	4+4	PR	4	100		100
	Lab course-II	Practicals based on course BT-III and BT-IV	4+4	PR	4	100		100
					24	**500**	**100**	**600**

Semester	Code	Title of the Course	Hr/Week	Type of Course	Credit	Marks		Total
						ESA	MSA	
II	BT-V	Molecular Genetics	4	CC	4	75	25	100
	BT-VI	Immunotechnology	4	CC	4	75	25	100
	BT-VII	Process Biotechnology	4	CC	4	75	25	100
	BT-VIII	(A) Enzymology (B) Nanobiotechnology	4	DSE	4	75	25	100
	Lab course-III	Practicals based on course BT-V and BT-VI	4+4	PR	4	100		100
	Lab course-IV	Practicals based on course BT-VII and BT-VIII	4+4	PR	4	100		100
					24	**500**	**100**	**600**

M.Sc. BT SY

Semester	Code	Title of the Course	Hr/Week	Type of Course	Credit	Marks		Total
						ESA	MSA	
III	BT- IX	Genetic Engineering	4	CC	4	75	25	100
	BT- X	Industrial Biotechnology	4	CC	4	75	25	100
	BT- XI	Plant Biotechnology	4	CC	4	75	25	100
	BT- XII	English and Science Communication Skills	2	SDC	2	40	10	50
	BT- XIII	Intellectual Property Right/Online certification course NPTEL /SWAYM /MOOC of equivalent credit	2	OE	2	50		50
	Lab course- V	Practicals based on course BT-IX and BT-X	4+4	PR	4	100		100
	Lab course-VI	Practicals based on course BT-XI	4	PR	4	100		100
					24	**515**	**85**	**600**

Semester	Code	Title of the Course	Hr/Week	Type of Course	Credit	Marks		Total
						ESA	MSA	
IV	BT- XIV	Computational Biology	4	CC	4	75	25	100
	BT- XV	Pharmaceutical Biotechnology	4	CC	4	75	25	100
	BT- XVI	Enviromental Biotechnology	4	CC	4	75	25	100
	BT- XVIII (Elective)	(A) Animal Biotechnology (B) Food Biotechnology	4	DSE	4	75	25	100
	Lab course-VII	Practicals based on course BT-XIV + XV+-XVI+XVII	4+4	PR	4	100		100
	Lab course-VIII	Project/ Review Writing	4	PR	4	100		100
					24	**500**	**100**	**600**

Note :

2. Pattern of Internal Assessment

CC- Core Course, DSE- Discipline Specific Elective, ESA- End Semester Assesment, MSA- Mid Semester Assesment

SDC- Skill Development Course, OE- Open Elective

Total Credits: 96

BT -I : Cell and Developmental Biology

Marks: 75 **M.Sc. BT FY** **Hours: 45**

Objective:

To understand the basics of Cell Biology and developmental Biology. To know the communication as well as transportation in cells. To become aware about the stem cell technology

Outcome:

Students will understand the basics of Cell Biology and developmental Biology and fundamentals of Cancer genetics. They will Identify the characteristics and basic needs of living organisms and ecosystems

Unit I: Study of Cell & its architecture

f cell size and shape, History & Evolution, Cell as the basic unit of life, cell theory, Structural organization of prokaryotes and eukaryotes. Biogenesis of Mitochondria, Chloroplast. Structure of model membrane, lipid bilayer and membrane protein diffusion, osmosis, ion channels, active transport, membrane pumps, mechanism of sorting and regulation of intracellular transport, electrical properties of membranes. Structure and function of Cell wall, nucleus, mitochondria, Golgi bodies, lysosomes, endoplasmic reticulum, peroxisomes, plastids, vacuoles, chloroplast, structure & function of cytoskeleton and its role in motility

Unit II: Cell-Cell interactions

General principles of cell communication cell adhesion and roles of different adhesion molecules, gap junctions, extracellular matrix, integrin's. Neurotransmission and its regulation. Hormones and their receptors, cell surface receptor, signaling through G-protein coupled receptors, signal transduction pathways, second messengers, regulation of signaling pathways, bacterial and plant two component systems, light signaling in plants, bacterial chemotaxis and quorum sensing. Regulation of hematopoiesis,

Unit III: Cell division & Cancer genetics

Mechanism of cell division mitosis, meiosis and genetic recombination; regulation of cell cycle; factors and genes regulating cell cycle. Genetic rearrangements in progenitor cells, oncogenes, tumor suppressor genes, cancer and the cell cycle, virus-induced cancer, metastasis, interaction of cancer cells with normal cells, apoptosis, therapeutic interventions of uncontrolled cell growth

Unit IV: Developmental Biology

Gametogenesis, Fertilization, cleavage, blastulation, Gastrulation & formation of germ layers in animals, Concepts of competence, determination, commitment and differentiation (dedifferentiation, re-differentiation, trans-differentiation) developmental plasticity in plant. Sex determination in plants & animals.

Unit V: Gene patterning & stem cells

Role of gene/s in patterning and development e.g. *Arabidopsis thaliana* (root, shoot, leaf & flower) & *Drosophila melanogaster* (maternal genes, bicoid, gap genes), Stem cells.

Text and Reference:

1. David Sadava; Cell and Molecular biology- Jones & Bartlett Publishers
2. Cell & molecular biology - Gerald karp :John Wills
3. Developmental biology- SF Gilbert Sinauer associates.
4. T.A. Brown – Genomes – Garland Science
5. Molecular Biology of the Cell- Alberts, B –Garland Science
6. Molecular cell Biology - Darnell, Lodish, Baltimore,-W.H. Freeman
7. Reproduction in Eukaryotic cells- DM Prescott, Academic Press.
8. Cell in Developmental and Inheritance- EB Wilson, MacMilan New York.
9. Fertilization-F T logo-Chapman and Hall
10. Molecular Biology of Steroid and Nuclear Hormone Receptors- LP Freedman,
11. Molecular Cloning: a Laboratory Manual- J. Sambrook, -CSHL Press,

PRACTICALS:

1. Microscopy: Bright field & phase contrast & fluorescence microscopy
2. Cell types of plants- Microtomy/ maceration of various tissue explants and identification
3. Study of Mitosis and Meiosis (root tips and anthers)
4. Study of karyotypes of genetic disorders and normal
5. Cell fractionation and separation at cell organelles chloroplast and Mitochondria
6. Pigment separation by TLC & Chromatography.
7. Analysis of chlorophyll amount by Spectrophotometer.
8. Drosophila culture: Cultivation, maintenance and *Drosophila* genetics study
9. Study of chick/ Frog/ Plant embryo for developmental study.