

- M. Sc. in BOTANY
- FIRST SEMESTER (ODD SEMESTER)

FACULTY OF SCIENCE

Eligibility Criteria  (Qualifying Exams)	Admission Criteria	Course Code	Course Type	Course (Paper/Subjects)	Credits	Contact Hours Per WeekK			EoSE Duration (Hrs.)	
						L	T	P	Thy	P
						<b>Bachelor Degree in any Science (Pure &amp; Bioscience )</b>  1) Merit List 2) Entrance Test (written or/and oral) if decided by the  University 3)  Observance of Reservation Policy.	MBT101	CCC	CELL AND MOLECULAR BIOLOGY	5
MBT111	CCC	CELL AND MOLECULAR BIOLOGY (PRACTICAL)	2	00	00		3	0	3	
MBT102	CCC	GENETICS AND CYTOGENETICS	5	4	2		0	3	0	
MBT112	CCC	GENETICS AND CYTOGENETICS (PRACTICAL)	2	00	00		3	0	3	
MBT103	CCC	PHYSIOLOGY AND BIOCHEMISTRY	5	4	2		0	3	0	
MBT113	CCC	PHYSIOLOGY AND BIOCHEMISTRY (PRACTICAL)	2	00	00		3	0	3	
MBT S01	OSC	RESEARCH METHODOLOGY & COMPUTER APPLICATION: BASICS	6	4	3		00	3	00	
MBT A01	ECC/CB	CONSTITUTIONALISM & INDIAN POLITICAL SYSTEM	6	4	3		00	3	00	
MBT A02	ECC/CB	RECOMBINANT DNA TECHNOLOGY AND PROTEOMICS								
					TOTAL= 33					

M.Sc (BOTANY)		IST SEMESTER	
COURSE CODE: MBT101		COURSE TYPE: CCC	
COURSE TITLE: CELL AND MOLECULAR BIOLOGY			
CREDIT:7		HOURS:135	
THEORY: 5	PRACTICAL:2	THEORY:90	PRACTICAL: 45
MARKS			
THEORY: 100 (30+70)		PRACTICAL:33	
<b>OBJECTIVE:</b> This course is aimed towards generating fundamental knowledge, concepts and dimensions of Botany/ Plant Science.			
<b>UNIT-1</b> 18 Hours	<b>Unit-1-Introduction to modern tools and techniques of cell biology:</b> advances in light and electron microscopy, techniques supplementing microscopy (cytochemistry, microprobe analysis, x-ray diffraction, etc.), Cell fractionation and visualization/characterization of various cell fractions.		
<b>UNIT-2</b> 18 Hours	<b>Unit-2-Cell components and their functions:</b> Dynamic structure, functions and biogenesis of cell wall and plasma membrane; new insights in structure and function of cytoplasmic cell organelles and biopolymers; nucleus; its components, chromatin structure in eukaryotes, condensation and packaging of DNA in prokaryotes, their dynamic state and role in gene regulation; structure and function of plant cytoskeletal genes and gene products; protein sorting and intracellular trafficking.		
<b>UNIT-3</b> 13 Hours	<b>Unit-3- Cell multiplication and turnover:</b> Cell cycle, Cell division and apoptosis,		
<b>UNIT-4</b> 14 Hours	<b>Unit-4- Gene structure, regulation and expression in eukaryotes:</b> Gene and promoter architecture, cisrons, regulatory sequences, enhancers and their mechanism of action, DNA replication; transcription - RNA polymerases, transcription factors, Introns, RNA splicing, alternative splicing, RNA stability - cap structure and function, polyadenylation; translation, posttranslational modifications.		
<b>UNIT-5</b> 13 Hours	<b>Unit-5-Organellar genomes:</b> Organization and function of mitochondrial and chloroplast genomes, diversity and evolution of organelle genomes, chloroplast protein targeting to different compartments, mitochondrial DNA and male sterility, transfer of genes between nucleus and organelles.		

**LABORATORY  
WORK****(MBT111  
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1. To exemplify the use of phase contrast and fluorescence microscopy in plant biology by studying phase objects and auto fluorescent specimens or those stained with Fluoro chromes, such as, carbo fluorescein diacetate, aniline blue, calcofluor white, Evans blue and neutral red.
2. Isolation and purification of nuclei and their staining with Feulgen stain or DAPI.
3. Isolation of mitochondria and their visualization with Janus green B and mitotracker.
4. Isolation of chloroplasts and determination of number of chlorophyll molecules per chloroplast.
5. Comparing the effect of some physical and chemical factors on the efficiency of photosynthetic electron transport.
6. To study the effect of inhibitors and uncouplers on the activity of succinic dehydrogenase, a marker enzyme of mitochondria.
7. Molecular characterization of GUS-actin constructs in *Arabidopsis thaliana* using microscopy and PCR.
8. Immuno staining of nuclei, chloroplast and/or mitochondria.

**SUGGESTED  
READING**

1. Alberts B, Johnson A, Lewis J, Raff Martin, Roberts K and Walter P. (2007) MolecularBiology of the Cell. Garland Publ., New York.
2. Bonifacino JS, Dasso M, Harford JB, Liipincott-Schwartz J and Yamada KM. (2004) ShortProtocols in Cell Biology. John Wiley & Sons, New Jersey.
3. Bregman AA (1987) Laboratory Investigations in Cell Biology. John Wiley & Sons, NewYork.
4. Hawes C and Satiat-Jeunemaitre B (2001) Plant Cell Biology: Practical Approach. OxfordUniversity Press, Oxford.
5. Hirt RP and Horner DS (2004) Organelles, Genomes and Eukaryote Phylogeny: Anevolutionary synthesis in the age of genomics. CRC Press.
6. Karp G. (2008) Cell and Molecular Biology: Concepts and Experiments. John Wiley &Sons.
7. Lodisch H, Berk A, Kaiser CA, Krieger M, Scott MP, Bretscher A, Ploegh H and MatsudaireP (2008) Molecular Cell Biology. WH Freeman & Co., New York.
8. Ruzin SE (1999) Plant Microtechnique and Microscopy. Oxford Univ. Press, Oxford.
9. Wischnitzer S. (1989) Introduction to Electron Microscopy. Pergamon Press, New York.

M.Sc (BOTANY)		IST SEMESTER	
COURSE CODE: MBT102 COURSE TYPE: CCC			
COURSE TITLE: GENETICS AND CYTOGENETICS			
CREDIT:7		HOURS:135	
THEORY: 5	PRACTICAL:2	THEORY:90	PRACTICAL: 45
MARKS			
THEORY: 100 (30+70)		PRACTICAL:33	
OBJECTIVE: This course is aimed towards generating fundamental knowledge, concepts and dimensions of Botany/ Plant Science.			
UNIT-1-8 Hours	<p><b>Unit-1-Microbial Genetics:</b> Viral and bacterial genomes and derived vectors; Recombination in viruses and bacteria (transformation, conjugation and transduction); Fine structure of gene; Prokaryotic gene regulation; Fungal genetics – mating types and genetic exchange, heterokaryosis, parasexual cycle.</p> <p><b>Mendelian and Non-Mendelian Inheritance:</b> Chromosome theory of inheritance; Mendelian laws; Gene interactions; Organelle inheritance.</p>		
UNIT-2-8 Hours	<p><b>Unit-2- Eukaryotic Genome:</b> Evolution, structure and organization; Gene regulation.</p> <p><b>Recombination in Eukaryotes:</b> Linkage and crossing over: basic concepts, linkage maps, correlation of genetic and physical maps, molecular markers and construction of linkage maps; Molecular mechanism of recombination; QTL mapping.</p>		
UNIT-3-8 Hours	<p><b>Unit-3- Mutation:</b> Basic concept, spontaneous and induced mutations, allele theory, physical and chemical mutagens; Molecular basis of mutations; Transposons and their use in mutagenesis and gene tagging in plant systems; Oncogenes and cancer.</p>		
UNIT-4-18 Hours	<p><b>Unit-4- Concepts in:</b> Developmental genetics; Behavioral genetics; Population genetics and Quantitative genetics.</p>		
UNIT-5-15 Hours	<p><b>Unit-5- Cytogenetics:</b> Chromosome: Structure and nomenclature, centromere and telomere; Sex determination: mechanisms, sex chromosomes; Chromosomal aberrations: Duplications, deficiencies/deletions, inversions, interchanges/translocations; Role of chromosomal aberrations in crop evolution; Ploidy changes: Haploids, polyploids and aneuploids; Genome analysis in crop plants; Molecular Cytogenetics: FISH, GISH, FIBER-FISH, Flow Cytogenetics, Flow karyotyping, Applications of molecular cytogenetics</p>		

**LABORATORY  
WORK**

(MBT112)

1. Preparation of mitotic and meiotic spreads and analysis of various stages of cell division (*Phlox*, *Allium* and *Rhoeo*).
2. Extraction of genomic DNA from plants by CTAB method.
3. Analysis of molecular polymorphism in parental lines and derived mapping population using different types of molecular markers.
4. Construction of a linkage map using available data.
5. Mutagenesis experiments in *E. coli*.
6. Experiments in *Neurospora/ Drosophila* genetics.

**SUGGESTED  
READING**

1. Acquah G (2007). Principles of Plant Genetics and Breeding, Blackwell Publishing Ltd. USA.
2. Allard RW (1999). Principles of Plant Breeding (2nd Edition), John Wiley and Sons.
3. Hartl DL and Jones EW (2007). Genetics – Analysis of Genes and Genomes, 7th edition, Jones and Barlett publishers.
4. Hartwell LH, Hood L, Goldberg ML, Reynolds AE, Silver LM, Veres RC (2006). Genetics –From Genes to Genomes, 3rd edition, McGraw Hill.
5. Lewin B (2008). Genes IX, Jones and Barlett Publishers.
6. Singh RJ (2002). Plant Cytogenetics, 2nd edition, CRC Press.
7. Smartt J and Simmonds NW (1995). Evolution of Crop Plants (2nd Edition) Longman.
8. Strickberger MW (2008). Genetics, 3rd Edition, Pearson (Prentice Hall).
9. Weising K, Nybom H, Wolff K and Kahl G (2005) DNA Fingerprinting in Plants: Principles, Methods and Applications, 2nd ed. Taylor and Francis Group, Boca Raton, FL.

M.Sc (BOTANY)		IST SEMESTER	
COURSE CODE: MBT103		COURSE TYPE: CCC	
COURSE TITLE: PHYSIOLOGY AND BIOCHEMISTRY			
CREDIT:7		HOURS:135	
THEORY: 5	PRACTICAL:2	THEORY:90	PRACTICAL: 45
MARKS			
THEORY: 100 (30+70)		PRACTICAL:34	
<b>OBJECTIVE:</b> This course is aimed towards generating fundamental knowledge, concepts and dimensions of Botany/ Plant Science.			
UNIT-1-8 Hours	<b>Unit-1-Protein structure:</b> Hierarchical structure of proteins; folding; ticketing; degradation; purification, detection and functional characterization; sequence alignments; molecular motors and pumps. <b>Enzymes and bioenergetics:</b> Application of principles of thermodynamics in biology; origin and evolution of biocatalytic reactions; significance of ribozymes; abzymes; artificial enzymes; enzyme technology; regulation of enzymatic activity; evolution of electron transport chain and its coupling to ATP synthesis; bioelectricity, photosynthesis and respiration.		
UNIT-2-8 Hours	<b>Unit-2- Signal Transduction:</b> Overview, second messengers, receptors and G-proteins, phospholipid signaling, role of cyclic nucleotides, calcium-calmodulin cascade, diversity in protein kinases and phosphatases, specific signaling mechanisms and their regulation, e.g. simple and hybrid type of two-component sensor-regulator system in bacteria and plants (examples of chemotaxis, osmosensing, ethylene and cytokinin signaling), quorum sensing.		
UNIT-3-18 Hours	<b>Unit-3- Sensory Photobiology:</b> Structure, function and mechanisms of action of phytochromes, cryptochromes and phototropins; stomatal movement; scotomorphogenesis and photomorphogenesis. Plant Movements & Stress Physiology.		
UNIT-4-18 Hours	<b>Unit-4- Plant hormones and other growth regulators:</b> Concept of hormones as chemical messengers, techniques for detection and quantitation of plant hormone, classical approaches and use of mutants in understanding hormone actions, hormones in defense against abiotic and biotic stresses, synthetic regulatory compounds and their uses.		
UNIT-5-15 Hours	<b>Unit-5- Physiology of plant reproduction:</b> Reproductive strategies in higher plants and their significance. Sexual and non-sexual modes. Flowering as a multi-organ function, floral induction, evocation and development. Regulation of flowering by light and temperature. Role of circadian rhythm. Involvement of hormones. Genetic, molecular and biotechnological aspects. Manipulation of flowering and floriculture. Vegetative propagation with special reference to epiphyllous budding.		

**LABORATORY  
WORK**

(MBT112)

1. In vivo assay for nitrate reductase in leaf tissues.
2. Comparative assessment of methods for protein quantitation.
3. Study of enzyme kinetics for determination of  $K_m$  value, nature of inhibition – competitive/non competitive.
4. Study of enzyme kinetics for effect of time/ enzyme concentration/ pH.
5. Extraction of proteins from plant tissue and their quantitative (Bradford<sup>™</sup> s) and qualitative (SDS, PAGE gel) analysis.
6. Detection of phosphoproteins in plant (Brassica) extract by pro Q diamond staining.
7. Qualitative and quantitative analysis of photosynthetic pigments and anthocyanins by spectrophotometric and chromatographic techniques.
8. PAGE analysis of pigment-protein complexes from chloroplasts.

**SUGGESTED  
READING**

1. Ainsworth C (2006) Flowering and its Manipulation, Annual Plant Reviews, Vol. 20. Blackwell Publishing, Oxford, U.K.
2. Brown TA. (2002) Genomes, BIOS Scientific Publishers Ltd, Oxford, UK.
3. Buchanan B, Gruissem G and Jones R. (2000) Biochemistry and Molecular Biology of Plants, American Society of Plant Physiologists, USA.
4. Davies P J. (2004) Plant Hormones: Biosynthesis, Signal Transduction, Action. 3rd Edition, Kluwer Academic Publisher, Dordrecht, The Netherlands.
5. Jordan BR. (2006) The Molecular Biology and Biotechnology of Flowering, 2nd Edition, CAB International, Oxfordshire, U.K.
6. Lodish H, Berk A, Kaiser CA and Krieger M. (2008) Molecular Cell Biology, 6th Edition, W.H. Freeman and Company, New York, USA.
7. Nelson DL and Cox MM. (2004) Lehninger Principles of Biochemistry, 4th Edition, W.H. Freeman and Company, New York, USA.
8. Taiz L and Zeiger E. (2006) Plant Physiology, 4th Edition, Sinauer Associates Inc. Publishers, Massachusetts, USA.

**COURSE TITLE : RESEARCH METHODOLOGY & COMPUTER APPLICATION: BASICS****CREDIT: 06****HOURS : 90****THEORY: 06****THEORY: 90****MARKS : 100****THEORY: 70 CCA : 30****OBJECTIVE:**

- Understands the concept and place of research in concerned subject
- Gets acquainted with various resources for research
- Becomes familiar with various tools of research
- Gets conversant with sampling techniques, methods of research and techniques of analysis of data
- Achieves skills in various research writings
- Gets acquainted with computer Fundamentals and Office Software Package .

**UNIT – 1 15 Hrs****CONCEPT OF RESEARCH :**

Meaning and characteristics of research , Steps in research process , Types of research –

i) Basic, applied and action research ii) Quantitative and qualitative research , Areas of research in concern discipline

**SELECTION OF PROBLEM FOR RESEARCH :**

Sources of the selection of the problem , Criteria of the selection of the problem ,Drafting a research proposal , Meaning and types of variables ,Meaning and types of hypotheses

**UNIT – 2 15 Hrs****TOOLS OF RESEARCH :**

Meaning and general information about construction procedure of (i) Questionnaire, (ii) Interview, (iii) Psychological test, (iv) observation (v) Rating scale (vi) Attitude scale and (vii) check list , Advantages and disadvantages of above tools

**SAMPLING :**

Meaning of population and sample , Importance and characteristics of sample , Sampling techniques - i) Probability sampling : random sampling, stratified random sampling, systematic sampling, cluster sampling ii) Non-probability sampling: incidental sampling, purposive sampling, quota sampling

**UNIT - 3 15 H rs****METHODS OF RESEARCH**

Meaning and conducting procedure of following methods of research : Historical method, Survey method, Case study, Causal comparative method , Developmental methods, Experimental methods

**UNIT – 4 15 Hrs****TREATMENT OF DATA :**

Level of measurements of data , Steps in treatment of data: editing, coding, classification, tabulation, analysis and interpretation of results

**WRITING RESEARCH REPORT :**

Sections of report : Preliminary section , Content section : various chapters, Supplementary section : appendices, references, abstract , Format and style

**UNIT – 5 15 Hrs****Computer Fundamentals**

**Computer System :** Features, Basic Applications of Computer, Generations of computers.

**Parts of Computer System :** Block Diagram of Computer System ; Central Processing Unit (CPU) ; Concepts and types of Hardware and Software, Input Devices - Mouse, Keyboard, Scanner, Bar Code Reader, track ball ; Output Devices - Monitor, Printer, Plotter, Speaker ; Computer Memory - primary and secondary memory, magnetic and optical storage devices.

**Operating Systems - MS Windows :** Basics of Windows OS ; Components of Windows - icons, taskbar, activating windows, using desktop, title bar, running applications, exploring computer, managing files and folders, copying and moving files and folders ;

**Control panel :** display properties, adding and removing software and hardware, setting date and time, screensaver and appearance ;

**Windows Accessories :** Calculator, Notepad, WordPad, Paint Brush, Command Prompt, Windows Explorer.

## UNIT – 6 15 Hrs

### Office Software Package

**Word Processing - MS Word :** Creating, Saving, Opening, Editing, Formatting, Page Setup and printing Documents ; Using tables, pictures, and charts in Documents ; Using Mail Merge sending a document to a group of people and creating form, letters and label.

**Spreadsheet - MS Excel :** Opening a Blank or New Workbook, entering data/Function/ Formula into worksheet cell, Saving, Editing, Formatting, Page Setup and printing Workbooks.

**Presentation Software - MS Power Point :** Creating and enhancing a presentation, modifying a presentation, working with visual elements, adding Animations & Transitions and delivering a presentation.

### SUGGESTED READINGS

*Agrawal, Y. P. (1988). **Better sampling : Concepts, Techniques and Evaluation.** New Delhi :sterling Publishers Private Ltd. Best, J. W. (1993).*

***Research in Education** (6th ed.) New Delhi : Prentice-Hall of India Pvt. Ltd. Broota, K. D. (1992) **Experimental design in Behavioral Research** (2nd ed.)*

*New Delhi : Wiley Eastern Limited.*

*Dasgupta, A. K. (1968). **Methodology of Economic Research.** Bombay: Asia Publishing House.*

*Edwards, A. L. (1957). **Techniques of Attitude Scale construction.** New York : Appleton-Century*

*Gall, M. D., Gall, J. P. and Borg, W. R. (2007). **Educational Research : An introduction***

*(8th ed.) Coston : Allyn and Bacon.*

*Garrett, H. E. & Woodworth, R. S. (1969). **Statistics in Psychology and Education.** Bombay :*

*Vakils, Fecffer & Simons Pvt. Ltd.*

*Goode, W. J. & Hatt, Paul K. (1952). **Methods in Social Research.** New York : McGraw-Hill.*

*Gopal, M. H. (1964). **An Introduction to research Procedure in Social Sciences.** Bombay : Asia Publishing House.*

*Hillway, T. (1964) **Introduction to Research** (2nd ed.) Noston : Houghton Mifflin.*

*Hyman, H. H., et al. (1975). **Interviewing in Social Research.***

*Chicago : University of Chicago Press.*

*Kerlinger, F. N. (1983) **Foundation of Behavioural Research. (2nd Indian Reprint)***

*New York : Holt, Rinehart and Winston.*

*Kothari, C. R. (2007) **Research Methodology: Methods & Techniques** ( 3rd ed.)*

*New Delhi : Wishwa Prakashan. Fundamentals Of Computers, Dr. P. Mohan, Himalaya Publishing House.*

*Microsoft First Look Office 2010, K. Murray, Microsoft Press.*

*Fundamental Of Research Methodology And Statistics, Y.K. Singh, New Age*

*International (P) Limited, Publishers. Practical Research Methods, Dr Catherine Dawson,*

*The Essence Of Research Methodology, Jan Jonker & Bartjan Pennink, Springer.*

<b>M.Sc (BOTANY)</b>		<b>IST SEMESTER</b>
<b>COURSE CODE: MBTA 01</b>		<b>COURSE TYPE: ECC</b>
<b>COURSE TITLE: CONSTITUTIONALISM &amp; INDIAN POLITICAL SYSTEM</b>		
<b>CREDIT: 06</b>	<b>HOURS : 90</b>	
<b>THEORY: 06</b>	<b>THEORY: 90</b>	
<b>MARKS : 100</b>		
<b>THEORY: 70</b>	<b>CCA : 30</b>	
<b>OBJECTIVE:</b>		
<ul style="list-style-type: none"> <li>- Understands the concept of Constitutionalism</li> <li>- Gets acquainted with various Indian Political System</li> <li>- Becomes familiar with various Union Executive</li> <li>- Gets conversant with Legislatures, Legislative Bills</li> <li>- Achieves skills in various writings</li> </ul>		
<b>UNIT - 1</b> Hrs	Unit-I: Meaning: Constitution, Constitutional government & constitutionalism; Difference between Constitution & Constitutionalism; Constitutionalism: Basis, Elements, Features & future. Forms of Government: Democracy & Dictatorship, Unitary & Federal, Parliamentary & Presidential form. Ideals of the Indian Constitution incorporated in the Preamble. Special Features of the Indian Constitution.	
<b>UNIT - 2</b> 24 Hrs	Unit-II: Concept of State and Citizenship, Judicial Review and Fundamental Rights, Directive Principles of the State Policy, Fundamental Duties, Procedure to Amend the Indian Constitution, Judiciary: Supreme Court and High Court, Judicial Activism and Public Interest Litigation and Provisions relating to Emergency.	
<b>UNIT - 3</b> rs	Unit-III: Union Executive- President, Prime Minister, Council of Ministers. State Executive- Governor, Chief Minister and Council of Ministers. Local Bodies & Panchayati Raj	
<b>UNIT - 4</b> 24 Hrs	Unit-IV: Parliament of India, State Legislatures, Legislative Bills: Ordinary, Money and Financial, Union State Relations, Principles of the „Separation of Power and the „Principles of Check & Balance“ .Political Parties and Pressure Groups. Challenges before Indian Democracy: Terrorism, Regionalism, Communalism, <i>Linguistics</i> and National Integration.	
<b>UNIT - 5</b> 20 Hrs	Unit-V: Controller & Accountant General of India, Solicitor General, Advocate General, Election Commission, Union and State(s) Public Service Commission, Finance Commission.	

**SUGGESTED  
READING  
GS**

HOBBS, Thomas, The Leviathan, Chapters XIII & XVII [entry]  
 LOCKE, John, The Second Treatise of Civil Government, Chapter IX [entry]  
 ROUSSEAU, Jean-Jacques, The Social Contract or Principles of Political Right  
 MONTESQUIEU, The spirit of the laws,  
 RAZ, Joseph, “The rule of law and its virtue”, in The authority of law, Oxford University Press, 1979  
 Dicey on British constitution  
 P. Ishwara Bhat Inter-relationship between Fundamental Rights  
 M P Jain Indian Constitutional Law  
 H M Seervai Constitutional Law of India  
 V N Shukla Constitution of India  
 D DBasu Shorter Constitution of India  
 B Sivarao Constitutional Assembly Debates  
 J. V R Krishna Iyer Fundamental Rights and Directive Principles  
 Paras Diwan Human Rights and the Law  
 P K Tripathi Some Insight into Fundamental Rights  
 S P Sathe Fundamental Rights and Amendment to the Constitution  
 P B Gajendragadkar Law, Liberty and Social Justice  
 David Karrys Politics of Law

<b>M.Sc (BOTANY)</b>		<b>IST SEMESTER</b>	
<b>COURSE CODE: MBTA02</b>		<b>COURSE TYPE: ECC</b>	
<b>COURSE TITLE: RECOMBINANT DNA TECHNOLOGY AND PROTEOMICS</b>			
<b>CREDIT:6</b>		<b>HOURS:90</b>	
<b>THEORY: 6</b>	<b>PRACTICAL:0</b>	<b>THEORY:90</b>	<b>PRACTICAL: 00</b>
<b>MARKS</b>			
<b>THEORY: 100 (30+70)</b>		<b>PRACTICAL:00</b>	
<b>OBJECTIVE:</b> This course is aimed towards generating fundamental knowledge, concepts and dimensions of Botany/ Plant Science.			

<b>UNIT-1-18 Hours</b>	<b>Unit-1-Principles and tools of recombinant DNA technology:</b> Restriction and nucleic acid modifying enzymes; restriction mapping;
<b>UNIT-2-18 Hours</b>	<b>Unit-2-</b> Principles of gel electrophoresis; choice of vectors; plasmids, phages, cosmids, plant viruses, synthetic DNA vectors;
<b>UNIT-3-18 Hours</b>	<b>Unit-3-</b> cDNA and genomic libraries; Isolation of specific genes from bacteria and higher plants; cloning; PCR and its applications; Principles of DNA sequencing.
<b>UNIT-4-18 Hours</b>	<b>Unit-4- Proteomics:</b> Comparative account of translation in prokaryotes and eukaryotes, post translational modifications, Use of vectors for over-expression of proteins, Protein extraction/purification techniques viz.,
<b>UNIT-5-18 Hours</b>	<b>Unit-5-Electrophoresis</b> and column chromatography, Introduction to proteome and proteomics and its relevance/significance in the post genomic era, Proteomics as a tool for plant genetics, breeding and diversity studies.

<b>SUGGESTED READING</b>	<ol style="list-style-type: none"> <li>1. Buchanan B, Gruissem G and Jones R (2000). Biochemistry and Molecular Biology of Plants, American Society of Plant Physiologists, USA.</li> <li>2. Harlow and Lane D (Eds.) (1988). Antibodies – A Laboratory Manual; Cold Spring Harbor Laboratory, USA.</li> <li>3. Lieber DC (2006). Introduction to Proteomics: Tools for New Biology; Humana Press, NJ.</li> <li>4. Pennington SR, Dunn MJ (Eds.) (2002). Proteomics: From Protein Sequence to Function, BIOS Scientific Publishers, United Kingdom.</li> <li>5. Sambrook J and Russell DW (2001). Molecular Cloning – A Laboratory Manual, Vols I – III, Cold Spring Harbor Laboratory, USA.</li> <li>6. Singer M and Berg P (1991). Genes and Genomes: A Changing Perspective; University Science Books, CA, USA.</li> </ol>
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