BHARATHIAR UNIVERSITY, COIMBATORE
B.Sc. BIOTECHNOLOGY DEGREE COURSE
SCHEME OF EXAMINATION - CBCS PATTERN

For the students admitted during the academic year 2014– 2015 batch onwards

Part	Study Components	Course title	Ins. hrs/ week	Examinations				Credit
				Dur.Hrs	CIA	Marks	Total Marks	
	Semester I							
I	Language – I		6	3	25	75	100	4
II	English – I		6	3	25	75	100	4
III	Core Paper I - Cell biology		4	3	25	75	100	4
	Core Paper II - Bioinstrumentation		4	3	25	75	100	4
	Practical I (Cell Biology, Bioinstrumentation and Genetics)		2	-	-	-	-	-
	Allied A : Chemistry I		4	3	20	55	75	3
	Allied Practical		2	-	-	-	-	-
IV	Environmental Studies #		2	3	-	50	50	2
	Semester II							
I	Language – II		6	3	25	75	100	4
II	English – II		6	3	25	75	100	4
III	Core Paper III – Genetics		5	3	25	75	100	4
	Core Practical I (Cell Biology, Bioinstrumentation and Genetics)		4	3	40	60	100	4
	Allied A : Chemistry II		4	3	20	55	75	3
	Allied Practical (Chemistry)		3	3	20	30	50	2
IV	Value Education – Human Rights #		2	3	-	50	50	2
	Semester III							
I	Language – III		6	3	25	75	100	4
II	English – III		6	3	25	75	100	4
III	Core Paper IV - Biochemistry		4	3	25	75	100	4
	Core Paper V- Microbiology		4	3	25	75	100	4
	Core Practical II (Microbiology & Biochemistry)		2	-	-	-	-	-
	Allied B: Paper I – Basic Mathematics		3	3	20	55	75	3
IV	Skill based Subject 1 - Human Physiology		3	3	20	55	75	3
	Tamil @ / Advanced Tamil# (OR) Non-major elective - I (Yoga for Human Excellence# / Women's Rights#/ Constitution of India #)		2	3	50		50	2
	Semester IV							
I	Language – IV		6	3	25	75	100	4
II	English – IV		6	3	25	75	100	4
III	Core Paper VI- Molecular Genetics		4	3	25	75	100	4
	Core Practical – II (Microbiology & Biochemistry)		3	3	40	60	100	4
	Allied B : Paper II – Computer applications		4	3	20	55	75	3
	Allied Practical (Computer applications))		2	3	20	30	50	2

IV	Skill based Subject 2 -Human Pathology	3	3	20	55	75	3
	Tamil @ /Advanced Tamil # (OR) Non-major elective -II (General Awareness#)	2	3	50		50	2
	Semester V						
III	Core paper VII Plant & Animal Biotechnology	4	3	25	75	100	4
	Core Paper VIII Immunology	4	3	25	75	100	4
	Core Paper IX environmental biotechnology	4	3	25	75	100	4
	Core Paper X Recombinant DNA Technology	4	3	25	75	100	4
	Core Practical III Immunology and Plant Tissue Culture	4	-	-	-	-	-
	Core Practical IV Microbial Biotechnology & rDNA technology	3	-	-	-	-	-
	Elective 1	4	3	25	75	100	4
IV	Skill based Subject 3 Diagnostic tools	3	3	20	55	75	3
	Semester VI						
III	Core Paper XI – Microbial Biotechnology	5	3	25	75	100	4
	Core Practical III- Immunology and Plant Tissue Culture	6	3	40	60	100	4
	Core Practical IV Microbial Biotechnology & rDNA technology	6	6	40	60	100	4
	Elective – II	5	3	20	55	75	3
	Elective – III	5	3	20	55	75	3
IV	Skill Based Subject 4 - Pharmacology	3	3	20	55	75	3
V	Extension Activities @	-	-	50	-	50	2
	Total					3500	140

@ No University Examinations. Only Continuous Internal Assessment (CIA)
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List of Elective papers (Colleges can choose any one of the paper as electives)		
Elective – I	A	Agricultural Biotechnology
	B	Bioremediation
	C	Introduction to Bioinformatics
Elective – II	A	Medical Biotechnology
	B	Biotechnological approach for waste water treatment
	C	Genomics
Elective - III	A	Industrial Biotechnology
	B	Bioethics & Biosafety
	C	Proteomics

Note :
The syllabus for the above papers (except Practical I, II and theory papers VII- Plant and Animal Biotechnology & Paper X – rDNA Technology) be the same as prescribed for the academic year 2011-12 revised. The Syllabus for the Practical I, II and theory papers Plant and Animal Biotechnology & rDNA Technology are furnished below:

CORE PRACTICAL I
(CELL BIOLOGY, BIOINSTRUMENTATION AND GENETICS**)**

1. Laboratory rules and regulations.
2. Microscopy
3. Cell Types - Microbial, animal and Plant cells
4. Identification of lymphocytes.
5. Fraction of Cellular components - Demonstration.
6. Mitotic Preparation - Onion Root Tip.
7. Drosophila – Morphology, Section culture and maintenance.
8. Identification of Mutants - Physical and Chemical Methods.
9. Experiments to determine Mendel's law.
10. Monohybrid and dihybrid cross using plants.
11. Sex chromatin (buccal smear)
12. Preparation of Buffer- Phosphate, Acetate, Tris.
13. Determination of OD using - Colorimeter, Spectrophotometer and pH.
14. Determination of Normality, Molarity, Molality, Percent Solution.
15. Paper Chromatography.
16. Thin layer chromatography.

CORE PRACTICAL II
(MICROBIOLOGY & BIOCHEMISTRY)

1. Media preparation and sterilization
2. Enumeration of microorganism and Pure culture technique
3. Measurement of growth of bacteria.
4. Staining of microorganisms.
5. IMVIC test
6. Carbohydrate fermentation test, TSI, H2S production test
7. Antibiotic sensitivity test
8. Estimation of Protein - Lowry's method.
9. Estimation of DNA by DPA Method
10. Estimation of RNA by Orcinol method
11. Estimation of Sugars by Anthrone method
12. Estimation of total free amino acids - Sulfovanicillin method.
13. Estimation of Lipids
14. Analysis of Oils- Iodine Number- Saponification Value -Acid Number.
15. Quantification of Vitamin C.

CORE PAPER: VII
Subject Title: PLANT AND ANIMAL BIOTECHNOLOGY

Subject description: This course presents the application of Plants in Biotechnology

Goals: To make the student to understood usage of Plant and Animal products and exploitation of them in Biotechnology.

Objectives: On successful completion of the subject, the student should have understood: Crop development, Callus culture, Biotechnological applications of plants,
Animal tissue culture, Animal products, production & improvement of them.

Unit I
Introduction to cell and tissue culture, Plant tissue culture media (composition, types and preparation), plant hormones and growth regulators in tissue culture, Preparation of suitable explants for organo genesis. Micropropagation on large scale, somatic embryogenesis, protoplast culture and somatic hybridization, Anther, pollen and ovary culture for production of haploid plants and homozygous lines.

Unit II
Cell culture methods for the secondary metabolite production, somaclonal variation and its significance, Cryopreservation, Gene banks for germplasm conservation.

Unit III
Animal cell cultures: Culture media – composition and preparation, Balanced salt solution and simple growth medium, chemical, physical and metabolic functions of different constituents of culture medium-Role of CO_2, serum and protein-free defined media and their applications; Culturing and maintenance of different animal cell lines (Primary and established cell lines). Characterization of cultured cell, measurement of viability, cyto-toxicity and growth parameters. Stem cell cultures, embryonic stem cell and their applications, cell culture based vaccines, measurement of cell death, apoptosis, scaling up animals cell cultures.

Unit IV
Transgenic animals: Method of obtaining transgenic animals using fertilized eggs and embryonic blastocyst cell, example, importance of transgenic animals – increased productivity of domestic animals, improved desired characters of domestic animals, production of recombinant gene products and proteins for pharmaceutical use. Animal models for tackling human diseases (Gene knock out in mice models).

Unit V
Transgenic silkworms. Animal cloning : Methods of cloning in animal system – Rat, Sheep, pig; importance of cloning. Gene therapy and cell mediated therapy.

REFERENCES
1. Plant genetic engineering, Dodds J.H.
2. Plant molecule biology, Grierson and S.V. Convey
3. Molecular biotechnology, Principle and applications of recombinant DNA technology, Bernard R Glick.
4. Plant Biotechnology-Monica Hughes.
5. Animal cell culture – a practical approach, 4th ED., Freshney. John Wiley Pub.

6. Mammalian Cell Biotechnology- A practical approach. ED Butler. Oxford UNI Press.
7. Methods in Cell Biology. VOL 57 Animal methods, ED Mather & Barnes, Academic Press**.**
8. Exploring Genetic mechanisms. ED Singer & Berg.

Core Paper: X
Subject Title: RECOMBINANT DNA TECHNOLOGY

Subject description: This course presents the mechanism of gene manipulation

Goals: To make the student to understood the concept of gene manipulation and gene transfer technologies

Objectives: On successful completion of the subject, the student should have understood: Manipulation of genes, Transfer techniques, Expression systems and methods of selection

UNIT-I
Plasmids –types of plasmids (F, R and Col), properties of plasmid, plasmid compatibility, copy number control. E.coli vectors- pBR322 and their derivatives, pUC vectors and their derivatives, BAC. Cloning in Bacillus and Streptomyces.

UNIT II
Molecular biology of lambda and Lambda vectors, cosmid, phagemid, M13.
Yeast vectors – YIP, YEP, YRP and YAC. Inducible promoters, selectable markers and expression vectors.

UNIT-III
Restriction and Modification systems of Bacteria. Restriction enzyme, DNA Polymerases, RNA polymerase, Taq polymerase, DNA Ligase, methylase, polynucleotide kinase, alkaline phosphatase, reverse transcriptase, DNaseI, S1nuclease, RnaseH, terminal deoxynucleotidyl transferase.

UNIT IV:
Animal vectors- SV40 Vectors, Retero viral and Baculo viral vectors, shuttle vectors.
Plant vectors - Ti plasmid as gene vector, Caulimo viruses, Gemini viruses, Transposable elements as vectors Construction of cDNA and genomic DNA libraries.

UNIT V
Probes - probe construction and labelling. Introduction of cloned genes into cell – transformation, transduction, particle bombardment, liposome mediation, electroporation, and cocultiovation identification of recombinant DNA. Hybridization techniques-Southern, Western and Northern blotting, Chromosome walking and jumping. DNA sequencing, Microarray. RFLP maps, RAPD markers, PCR, antisense technology, terminator gene technology, DNA finger printing.

REFERENCES**:**

1. Ernst.L.Winnacker, (2003) from genes to clones, 2nd edition, Panima publishing corporation, NewDelhi.
2. James.D.Watson(2001) Recombinant DNA technology,2nd edition, WH Freeman and company, New York.
3. Glick and Pasternak,(1996),Molecular biotechnology, Panima publishing corporation.NewDelhi.
4. BrownT.A., (1998) Introduction to gene cloning, 3rd edition, Stanley Thomas Publishing Ltd, London.
5. PrimroseS.B., (2003) Principles of gene manipulation,6th edition, Blackwell Science Ltd, Germany.