

BHARATHIAR UNIVERSITY, COIMBATORE 641 046.

B.Sc. BIOTECHNOLOGY DEGREE COURSE

(Affiliated Colleges)

(FOR THE CANDIDATES ADMITTED FROM THE ACADEMIC YEAR 2017-18 onwards)

SCHEME OF EXAMINATION - CBCS PATTERN

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 Microbiology)		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 – Microbiology		5	3	25	75	100	4
	Core Practical I (Cell Biology, Bioinstrumentation and Microbiology)		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- Genetics		4	3	25	75	100	4
	Core Practical II (Genetics & 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 (Genetics & 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/Internship training (Research Institute/ Industry) @	-	-	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 Practical I, II, Core paper V, VI and VII are revised below for the candidate admitted from the academic year 2017-18 onwards. There is no change in the syllabi of remaining papers.

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

1. Laboratory rules and regulations.
2. Handling of Microscopy
3. Preparation of Buffer- Phosphate, Acetate, Tris.
4. Determination of OD using - Colorimeter, Spectrophotometer and pH.
5. Media preparation and sterilization
6. Enumeration of microorganism – Spread and Pour
7. Pure culture technique – Streaking techniques
8. Measurement of growth of bacteria.
9. Staining of microorganisms – Gram, negative, acid fast, spore and fungal(LCB)
10. IMVIC test
11. Antibiotic sensitivity test
12. Permanent Slide preparation
13. Hanging Drop Technique

**CORE PRACTICAL II
(GENETICS & BIOCHEMISTRY)**

1. Isolation of Genomic DNA from Blood
2. Sex chromatin (Buccal smear)
3. Paper Chromatography.
4. Thin layer chromatography.
5. Mitotic Preparation - Onion Root Tip.
6. Estimation of Protein - Lowry's method.
7. Estimation of DNA
8. Estimation of RNA by Orcinol method
9. Estimation of Sugars by Anthrone method
10. Estimation of total free amino acids
11. Estimation of Lipids
12. Analysis of Oils- Iodine Number- Saponification Value -Acid Number.
13. Quantification of Vitamin C.

**CORE PAPER: V
Subject Title: GENETICS**

Subject description: This course presents the way characters get transferred through generations and methods to analyze and modify them

Goals: To make the student to understand the concept of genes and their behaviour

Objectives: On successful completion of the subject the student should have understood:
Basic genetics and their role

UNIT I

History of Genetics - Mendelian Principles, Segregation, Independent Assortment, Dominance. Multiple alleles, Incomplete dominance, Over dominance and co dominance.

UNIT II

Epistasis, lethal genes. Sex determination and sex linkage in diploids, linkage and crossing over, gene mapping. Chromosomal theory of inheritance, maternal effects.

UNIT III

Chromosomal variation in number, Changes in Chromosomal structure, Genetics of Hemoglobin, Transposable elements in prokaryotes and eukaryotes.

UNIT IV

Structure of chromosome, fine structure of Gene, cistron, recon, Structure of Eukaryotic gene, Experimental evidence for DNA as the genetic material, cytoplasmic genetic systems- mitochondria and chloroplast DNA.

UNIT V

Genetic control of Development in Drosophila. Population genetics, calculating gene frequency, factors affecting gene frequency. Pedigree analysis and genetic counselling.

REFERENCES:

1. Basic genetics by D.L.Hartl, 1991, Jones and Bartett public.
2. Friedfelder 1987, Microbial genetics, Jones and Bartett public.
3. Molecular Biology of the genes 4th Ed. Watson et.,al, the Benjamin /Cummings coins 1987
4. Molecular by cell biology, 1994.Lodish, Baltimore scientific American books,Inc.
5. Genetics Strickberger.M
6. Genetics by Goodenough

CORE PAPER: VI

Subject Title: MOLECULAR GENETICS

Subject description: This course presents the genetics at molecular level

Goals: On successful completion of the subject the student should have understood the molecular aspects of genetics

UNIT- I

Organization of genome – Structure and function of DNA and RNA. Experiment to prove semiconservative mode of replication. DNA replication in prokaryotes and eukaryotes. Types- unidirectional, bidirectional and theta model replication. Enzymology of replication.

UNIT – II

Gene as the unit of expression- Co linearity, Transcription, post transcriptional modifications (mRNA, tRNA,rRNA), transcriptional regulation in prokaryotes (operon concept-lac operon), inhibitors of transcription. Elucidation of genetic code.

UNIT – III

Translation of protein – post translational modifications and folding of newly assembled polypeptides, translational regulations, signal sequences and protein export.

UNIT – IV

Gene mutation – Biochemical basis of mutations – types of mutations- spontaneous and induced mutations; Ames test for mutation; DNA damage – types of DNA repair mechanisms – photo reactivation excision repair, post replication recombinant repair, SOS repair

UNIT – V

Recombination - Homologous and non-homologous recombination, including transposition, site-specific recombination. Genetic exchange – bacterial transformation, transduction, conjugation and their mapping.

REFERENCES:

1. Basic Genetics by D.L. Hartl 1991, Jones & Bartlett publications.
2. Microbial Genetics, Friefelder 1987 – Jones & Bartlett publications
3. Molecular Biology of the gene 4th edition by Watson et al, The Benjamin / Cummings co
4. Molecular Cell Biology by Lodish 1994, Baltimore Scientific American Brocks

Semester – V 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 understand 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. Plant transformation techniques - Agrobacterium mediated gene transfer – Mechanism of DNA transfer, general features of TI and their use as vectors, role of virulence genes, reporter genes, transgenic plants.

Unit III

Animal cell cultures: Culture media – composition and preparation, Balanced salt solution - chemical, physical and metabolic functions of different constituents of culture medium-Role of CO₂, 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.

Unit IV

Transgenic animals: Method of obtaining transgenic animals using fertilized eggs and embryonic blastocyst cell, 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. Ethical issues in Animal Biotechnology.

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.