

DEPARTMENT OF BIOTECHNOLOGY  
 B.Sc. SYLLOBUS  
 BANGALORE UNIVERSITY  
 Three Year B.Sc course Semester Schmes  
 Biotechnology.

Sem ester	Title of the paper	Lecture hours per week	Practical hours per week	Theory		Practical		Internal Assessment	Total marks
				Duration of exam in hours	Maximum Marks	Duration of exam in hours	Maximum Marks	Marks	
I	BTP 101- Cell Biology and Genetics	4		3	60			10	100
	BTP 102-		3			2	30		
II	BTP 201- Microbiology and Biostatistics	4		3	60			10	100
	BTP 202		3			2	30		
III	BTP 301- Biochemistry and Biophysics	4		3	60			10	100
	BTP 302-		3			2	30		
IV	BTP 401- Molecular Biology	4		3	60			10	100
	BTP 402		3			2	30		
V	BTP 501- Genetic Engineering and Environmental Biotechnology	3		3	60			10	100
	BTP 502-		3			2	30		
	BTP 503- Immunology and Animal Biotechnology	3		3	60				100
	BTP 504-		3						
VI	BTP 601-Plant Biotechnology	3		3	60			10	100



## Unit 3. Interaction of Genes

Supplementary factors: Comb patten in fowls

Complementary genes: Flower colour in sweet peas

Multiple factors-skiing colour in human beings

Epitasis: Plumage colour in poultry

Multiple alleles: Blood groups in human beings.

4

hrs.

## Unit 4: Sex Determination in Plants and animals

Concept of allosomes and autosomes. XX-XY-XX-XO-ZW-ZZ ZO-ZZ types

2

hrs

## Unit 5: Linkage and Crossing Over

Coupling and repulsion hypothesis Linkage in maize and Drosophila, Mechanism of crossing over importance, Chromosome mapping-linkage map in maize.

## Unit 6: Chromosomal Variations

A general account of structural and numerical aberrations, chromosomal evolution of wheat and cetton.

4

hrs

## Unit 7: Cytoplasmic Inheritance

Plastid inheritance in Mirabilis, Petite characters in yeast and Kappa particles in Paramecium

## Unit 8: Mutation

Types: spontaneous and induced, Mutagens: Physical and chemical, Mutation at the molecular Mutations in plants, animals, and microbes for economic benefit of man.

4 hrs

## Unit 9: Human Genetics

Karyotype in man, Inherited disorders-Alamosa (Klinefelter syndrome and Turner's syndrome Autosomal (Down syndrome and Cri-Du-Chat syndrome).

2 hrs

**Semester I****BTP 102- Cell Biology and Genetics****Total Units**

- |  |    |
|--|----|
| 1. Use of Micrometer and calibration, measurement of onion epidermal cells and yeast.        | 2  |
| 2. Cell division Mitotic and meiotic studs in grasshopper testes. Onion root tips and flower | 1  |
| 3. Chromosomes: Mounting of polygene chromosomes   | 11 |
| 4. Buccal smear-Barr bodies  | 11 |
| 5. Karyotype analysis-Man and onion  |    |
| Man-Normal and Abnormal-Down and Turner's syndromes (with the help of sliders)               | 21 |
| 6. Simple genetic problems (problems on Interaction of genes)                                |    |
| 7. Isolation of chloroplasts and rnito chondria  |    |
| 8. Vital staining of mito chondria   |    |
| 9. Blood smear-differential staining   |    |

**EACH STUDENT IS REQUIRED TO SUBMIT 5 PERMANENT SLIDES****(MITIOSIS & MEIOSIS – at least two from each)****References:**

Cell Biology

1. Molecular Biology of Cell-Bruce Albert's et.al, Garland publications
2. Animal Cytology & Evolution-MJD. White Cambridge University Publications
3. Molecular Cell Biology Daniel. Scientific American Books
4. Cell Biology-Jack D. Bruke, The William Twikins Company
5. Principles of Gene Manipulations-Old & Princes Black Well Scientific Publications
6. Cell Biology-Ambrose & Dorothy M Eastry, ELBS Publications
7. Fundamental of cytology sharp, Mc Graw Hill Company
8. Cytology- Willson & Morrison, Rein form Publications
9. Molecular Biology-smith Faber & Faber Publications
10. Cell Biology &Molecular Biology EDP Robberies & EMF Robberies, Saunder College
11. Cell Biology C.B. Powar, Himalaya Publications

#### GENETIC

1. Basic Genetics – Daniel L. Hartl Jones & Barlett Publishers USA
2. Human Genetics and Medicine – New Studies in Biology by Cynl A Clark Edward Arnold Publishers London.
3. Genetics –Monroe W Struck burger, Macmillan Publishers, New York
4. Genes V – Benjamin Lewin Oxford University Press.
5. Genes I-Benjamin lewin, Wiley & Sons Publications
6. Genes II- Benjamin Lewin, Wiley & Sons Publications
7. Genes III- Benjamin Lewin, Wiley & Sons Publications
8. Principles of Genetics – Winchester Sinnott & Dorn
9. Genetics –Blue Print of life by Sandhya Mitra, Tata & McGraw Hill Publications
10. Genetics-Edgar Altenburg oxford & IBH Publications
11. Principles of Genetics –E.J. Gardener, M.J. Simmons and D.P. Snustad, John Wiley & Sons Publications

#### **Semester II                   BTP 201- Microbiology and Biostatistics**

##### **Part A: Microbiology**

**Total hours allotted-45**

##### Unit 1. Introduction and Scope of Microbiology

Definition and history of microbiology, contributions of Antony van Leeuwenhoek, Louis Pastern, Koch Joseph Lister, and Alexander Flanging . Importance and scope of Microbiology as a modern science Branches of Microbiology.

5 hrs

##### Unit 2. Microscopy

Struction and working principles of different types of microscopes-Compound, Dark field contrast. Fluorescence and Election (Scanning and Transmission)

5

hrs

##### Unit 3. Microbial Techniques

A). STERILIZATION: Principles and applications of

a. Physical Methods: Autoclave, Hot air oven, Laminar airflow, Seitz filter, Sintered glass filter, membrane filter.

b. Chemical Methods: Alcohol, Aldehydes, Phenols, Halogens and Gaseous agents.

c. Radiation Methods: UV rays and Gamma rays.

5

Hrs

B). STAINS AND STAINING TECHNIQUES: Principles of staining, Types of stains-simple structural stains and Differential stains.

2

Hrs.

Unit 4. Microbial Taxonomy	
Concept of microbial species and strains, classification of bacteria based on-morphology (shape flagella), staining reaction, mutation and extreme environment.	4
Hrs	
Unit 5. General Account of Viruses and Bacteria	
A. VIRUSES- Structure and Classification	
Plant viruses-CAMV	
Animal viruses-Hepatitis B	
Bacterial vines- lambda phage	
B. BACTERIA-Ultra structure of a bacterial cell (both Gram positive and Gram negative) includes end spore and capsule.	8
hrs	
Unit 6. Eulsaryotic microorganisms	
Salient features, classification and reproduction of fungi, mycoplasma and algae.	4
hrs	
Unit 7. Pathogenic Microorganisms	
A. Bacterial diseases of man-Tetanus, Tuberculosis, pneumonia and Cholera	
B. Viral disease; ALDA (HIV)	6
hrs	
Unit 8. Microbial Metabolism	
A) Respiration: EMP, HMI and ED Pathways, Krebs's cycle, Oxidative Phosphoryiation.	
B) Bacterial Photosynthesis Photosynthetic apparatus in Prokaryotes, Photophosphorylation & I reaction.	

**PART-B BIOSTATISTICS**

Unit 1. Importance and applications	
Tabulation and Classification of data, Frequency distribution and Graphical distribution of data	
	2hr
	s
Unit2 Measure of Central tendencies	
Mean, Media, mode and their properties	3
hrs	
Unit 3. Measures and Dispersion	
Mean deviation, Variance, Standard deviation and Coefficient of Variation.	3
Hrs	
Unit 4. Hypothesis Testing	
Student T and Chi-square test	2
Hrs	
Unit 5. Probability and Distribution	
Concepts and problems on probability, Binomial, Poisson, Normal Distribution and their applications	3
Hrs	
Unit 6. Different Models of data presentation with special reference to biological samples	

<b>Semester II</b>	<b>BIP 202 Microbiology</b>	<b>Total Units allotted : 15</b>
1. Safety measures in microbiology laboratory		1 Unit
2. Cleaning and sterilization of glass ware		
3. Study of instruments: Compound microscope, Auto cleave, Hot air oven, pH meter, Laminar airflow and centrifuge.		
2 Units		
4. Staining Techniques Simples, Negative staining, Gram Staining, Endoscope staining and tug staining.		4 Units
5. Medical preparation : Nutrient agar, MRBA and Nutrient broth.		2Units
6. Isolation of bacteria and fungi from soil, air, and water-diction and pour plate methods.		2 Units
7. Estimation of micro organisms-Total Count (harem hyetometer)		1 Units
8. Antibiotic sensitivity test-paper disc method		1 Units
9. Biochemical tests-starch hydrolysis, catalane & gelatin liquefaction.		1 Units
10. Study of Rhizaobium from root nodules of legumes.		1 Units

**Reference: MICROBIOLOGY**

1. Microbiology-Pelzer, Chan, Krieg Tata McGraw Hill Publications
2. Microbiology- Concepts and applications by Paul A. Ketchum Wiley Publications
3. Fundamentals of Microbiology –Furbisher, Saunders & Toppan Publications
4. Microbiology –Ronald M. Atns
5. Introductory Biotechnology-R.B Singh C.B.D India (1990)
6. Industrial Microbiology-Casual Wiley Eastern Ltd
7. Fundamentals of Bacteriology sale
8. Fontiers in Microbial technology-P.S. Bison, CBS Publishers.
9. Biotechnology, International Trends of perspectives A. T. Bull, G. Holl M.D. Lilly Oxford & T Publishers.
10. General Microbiology –C.B. Powar, H.F. Daginawala, Himalayan Publishing House

**BIOSTATISTICS**

1. Bliss, C.J.K. (1967) Statistics in Biology, Vol. I Mc Graw hill. New York.
2. Campbell R.C. (1974) Statistics for Biologists, Cambridge Univ, Press, Cambridge
3. Daniel (1999) Biostatistics (3rd edition) Panima Publishing, Compotation
4. Sward law, A. C. (1985) Practical Statistics for Exponents Biologists, John Wiley and Sons, In
5. Khan (1999) Fundamentals of Biostatistics Publishing corporation

**STER III**

**BTP 301- Biochemistry and Biophysics**

**PART-A: BIOCHMEISTRY**

**Total Hours allotted 38**

**Hours**

**DLECULES**

\* Amino acids

fiction and properties

4

hrs

\* Proteins

fication based on structure and functions, structural organization of proteins (primary, secondary, y and quaternary structure)	10
hrs	
Enzymes	
function, classification, enzyme kinetics, factors influencing enzyme activity, co-enzymes and co	
*Carbohydrates	
ture, properties and classification, Carbohydrates as a source of energy	5
hrs	
5. Lipids	
ture, properties, classification and functions.	4
hrs	
6. Vitamins	
Soluble and fat-soluble vitamins Dietary source.	4
hrs	
7. Hormones	
old hormones-structure and importance in brief	3
hrs	

**PART-B: BIOPHYSICS**

**Total hours allotted 22**

**Hours**

1. Scope and development of Biophysics.	1
hrs	
2. pH and buffer concepts.	2
hrs	
3. Chemical bonding – Ionic bond, covalent bond, hydrous bond and peptide bond vainer walls Principles of thermodynamics.	
4 hrs	
4. Analytical techniques	
Ciples and applications of	
Chromatography (Paper, thin – layer, column and GLC)	
Centrifugation (RPM and G, Ultra centrifugation)	7
hrs	
5. Spectroscopic techniques	
Visible spectroscopic, X-ray crystallography, NMR, IR, fluorescence & atomic absorption	
4hrs	
6. Isotopes	
Their importance in biological studies, measure of radioactivity, GM counters & Scintillation	

**SEMESTER IV BTP 401 MOLECULAR BIOLOGY Total Hours Allotted 60**

**Hours**

Unit 1. Molecular of Life – an introduction experimental proof of DNA and RNA as genetic material.	3
hrs	
Unit 2. Nucleic Acids	
Structure and function of DNA and RNA	
Watson and Crick model of DNA and other forms of DNA (A and Z)	

Functions of DNA and RNA including ribosome's hrs	7
Unit 3. DNA Replication Prokaryotic and Eukaryotic-Enzymes and proteins involved in replication, Theta model and Rolling circle model. hrs	6
Unit 4, DNA Repair Causes and mechanism –photo reactivation, excision repair, mismatch repair, SOS repair. 4hrs	
Unit 5 Recombination in prokaryotes Transformations, Conjugation and Transduction. hrs	5
Unit 6, Structure to Prokaryotic and Eukaryotic gene-genetic code, Properties and Wobble hypothesis. hrs	5
Unit 7 Transcription in Prokaryotes and Eukaryotes Mechanism, promoters and RNA polymerase, transcription factors, post transcriptional modifications a eukaryotic mRNA. hrs	7
Unit 8 Translation Mechanism of translation in Prokaryotes and Eukaryotes, Post translational modifications of proteins hrs	8
Unit 9 Regulation of Gene expression Regulation of Gene expression in Prokaryotes-Person concept (Lac and Trip) Regulation of Gene expression in Eukaryotes –transcriptional activation, galactose metabolism in yeast hrs	8
Unit 10. Gene organization and expression in Mitochondria and chloroplasts. hrs	3
Unit 1. Inspectional elements and transposes. Transposable elements in Maize and Drosophila. hrs	4

### **BTP 302- Biochemistry**

### **Total Units allotted**

**15**

- |  |        |
|--|--------|
| 1. Preparation of Buffers-Crave and phosphate.<br>1unit  |        |
| 2. Estimation of reducing suggest Glucose Maltose and lactose by DNA, H.J and Somoji's<br>methods. | 4 unit |
| 3. Estimation of Protein by Binretmetka and Lowry's method   | 3 unit |
| 4. Assay of enzyme activity-anylese.   |        |
| 5. Separation of Sugars by TLC   | 2unit  |
| 6. Estimation of Amino acids   | 2 unit |
| 7. Estimation of inorganic phosphate by subbed row method  | 1 unit |



**Reference: BIOCHEMISTRY**

1. Principles of Biochemistry- AlbertL Lehninger CBS Publishers & Distributors.
2. biochemistry-Labret Stryer \_\_\_\_\_ International Edition.
3. Biochemistry-Keshav Trehan Wiley Eastern Publications
4. Fundamentals of Biochemistry J.L. Jain S.Chand and company
5. Biochemistry, Prasaranga, Bangalore University
6. Fundamental of Biochemistry-Dr. A..C. Deb
7. Textbook of Organic Chemistry (A Modern approach) P.L. Soni, Sultan Chand and Sons, Publishers.
8. The Biochemistry of Nucleic acid-tenth Edition-Roger L.P. Adams, John T. Knower and David P. Leader, Chapman and Hall Publications.

**BIOPHYSICS**

1. Narayanan, P (2000) Essentials of Biophysics, New Age Int. Pub. New Delhi.
2. Bliss, C.J.K. (1967) Statistics in Biology, Vol. I Mc Graw hill. New York.
3. Campbell R.C. (1974) Statistics for Biologists, Cambridge Univ, Press, Cambridge
4. Daniel (1999) Biostatistics (3rd edition) Panima Publishing, Computation
5. Sward law, A. C. (1985) Practical Statistics for Exponents Biologists, John Wiley and Sons, In
6. Khan (1999) Fundamentals of Biostatistics Publishing corporation
7. Roy R.N. (1999) A Text Book of Biophysics New Central Book Agency.

**BTP 402 –Molecular Biology**

Total Units Allotted 15

- |  |         |
|--|---------|
| 1.Preparation of DNA model.  | 1 units |
| 2. Estimation of DNA by DPA method.  | 1 units |
| 3. Estimation of RNA by Ordinal method.  | 1 units |
| 4. Detergent lyses of RBC  | 1 units |
| 5. Osmotic lyses of RBC  | 1 units |
| 6. Extraction and estimation of protein from animal goat liver/muscle soured by sait precipitation & Organic solvent method.         | 3 units |
| 7. Extraction and estimation of protein from animal or plant source (Green gram/Pea) by salt precipitation & Organic solvent method. |         |
| 8. Protein separation by Polycrylamide Gel Electrophoresis (PAGE)  | 3 units |
| 9. Charts on Conjugation, Transformations and Transduction.  | 1 units |

**Reference: MOLECULAR BIOLOGY**

1. Glick, B.R. and Pasternak J.J (196) Molecular biotechnology, Principles and application of recombinant DNA, Washington D.C. ASM press.
2. Howe C (195) Gene cloning and manipulation, Cambridge University Press, USA
3. Lewin, B. Gene VI New York, Oxford University Press
4. Rigby P.W.J (1987) Genetic Engineering Academic Press Inc. Florida, USA
5. Sam brook al (2000) Molecular cleaning Volumes I, II, & III, Cold spring Harbor Laboratory Press, New York USA
6. Walker J.M and Giggled, E.B (1983) Molecular Biology & Biotechnology (Indian Edition) Royal Society of Chemistry U.K.
7. Karp. G (2002) Cell & molecular Biology , 3rd Edition John Wiley & Sons; INC

**Semester V BIT 501 Genetic Engineering and Environmental Biotechnology**

Total Hours Allotted 45

**Hours**

PART A: Genetic Engineering	Total Hours Allotted 25 Hours
1. Introduction to Genetic Engineering	1 hrs
2. Tools for genetic engineering	
NA manipulative enzymes-Restriction enzymes and DNA legates	1 hrs
Erne cloning vectors-Plasmids, Bacteriophage and Cosmids.	3 hrs
3. In vitro construction of recombinant DNA molecules-(pBR 332, pUC 19) Isolation of passenger actor DNA, creation of r-DNA	3 hrs
4. Transformation of r-DNA Transformation of r-DNA molecules into target host organisms cloned mediated, Electro oration and microinjection.	2 hrs
5. Screening and selection of recombinant host cells-Immunological screening and Colony iodization.	2 hrs
6. Gene Libraries-Genomic DNA and DNA cloning techniques.	2 hrs
7. Expression of cloned DNA in E coli	1 hrs
8. Molecular biology techniques	6 hrs
Electrophoretic techniques –Proteins and nucleic acids	
Polymerase chain reaction (PCR)	
Site directed mutagenesis (SDM)	
Nucleic and sequencing – Sanger’s method	
Blotting techniques-Southern, Western and Northern blot.	
9. Application of r-DNA technique in human health.	4 hrs
Production of Insulin	
Production of recombinant vaccines-Hepatitis –B	
Production of human growth hormone	

**PART-B : ENVIRONMENTAL BIOTECHNOLOGY**

**Total Hours Allotted: 30 hrs**

1. Renewable and Non-Renewable resources of energy	1
hrs	
2. Conventional fuels and their environmental impact-Firewood, Plant, animal, Water, Coal and	
	2 hrs
3. Modern fuels and their environmental impact-Methanol genie bacteria, Biogas, Microbial rogen Production, conversion of sugar to alcohol & Gasohol.	3
hrs	
4. Bioremediation	
Remediation of soil & water contaminated with oil spills, heavy metals and detergents. Degradation and cellulose using microbes, Phytore mediation. Degradation of pesticides and other toxic. Chemicals by Micro-organisms-Degradation of Aromatic and chlorinated hydrocarbons and petroleum products.	06
hrs	
Unit 5. Treatment of Municipal waste and Industrial effluents	2
hrs	
Unit 6. Biofertilixers	

Role of symbiotic and symbiotic nitrogen fixing bacteria in the enrichment of soil. Algal and Fungal bio fertilizers (VAM) 3 hrs

#### Unit 8 Bioleaching

Enrichment of ores by microorganisms (Gold, Copper and Uranium) 2 hrs

Unit 9. Environmental Significance of Genetically modified microbes, plants and animals 1hrs

### **BTP 502- Genetic Engineering and Environmental Biotechnology**

Total Units Allotted :15

- |   |        |
|---|--------|
| 1. Isolation of genomic DNA from bacteria, plant and animal tissue. | 3units |
| 2. Isolation of plasmid DNA (E. coli)                               | 1 unit |
| 3. Restriction Digestion of DNA                                     | 2 unit |
| 4. Separation of DNA by Gel Electrophoresis                         | 2 unit |
| 5. SDS-PAGE   | 2 unit |
| 6. Bacterial Examination of water by MPN Method                     | 2 unit |
| 7. Estimation of BOD (2 samples)                                    | 2 unit |
| 8. VAM staining   | 1 unit |

#### **Reference: GENETIC ENGINEERING**

1. Glick, B.R. and Pasternak J.J (196) Molecular biotechnology, Principles and application of recombinant DNA, American Society for Microbiology, Washington D.C..
2. Christopher H (1995) Gene cloning and Manipulation, Cambridge University Pres..
3. Nicholls, D.S.T (1994) An Introduction of Genetic Engineering Cambridge University Press.
4. Old, R.W. and Primrose, S.B. (1986) Principles of gene manipulation, An introduction to genetic engineering (3 rd Edition) Blackwell, Scientific Publications.
5. Watson, J.D. Hopkins, N.H. Roberts, J.W. Sretetz, J.A. and Weiner, A.M. (1988) Molecular Biology the gene the Benjamin/Cummings Publishing Company, Inc.
6. Kucherlpati.R and Smith G.R. Editors (1983) Genetic recombination. Washington D.C. America Society for Microbiology.
7. Lewin, B. Gene VI New York, Oxford University Press

#### **ENVIRONMENTAL BIOTECHNOLOGY**

1. Microbial Biotechnology (1995) Alexander N. Glazer Hiroshi Nikaido W.H. Freeman and Company
2. Molecular biotechnology Principles and Applications of Recombinant DNA Bernal R. Glick and Jack J. pasternak ASM Press. Wastington D.C. (1994)
3. Funal \_\_\_\_\_ and Biotechnology (1993) Rastogi Publications Meenit

#### **Semester VI**

### **BTP 601- Plant Biotechnology**

Total Hours Allotted: 45 hrs

Unit 1. in-vitro methods in plant tissue culture, Aseptic Techniques, Nutrient media, and use of growth regulators (axons, Cytokines and Gibberellins).

Unit 2. In-vitro fertilization-Ovary and Ovule culture.  
2hrs

Unit 3. Clonal propagation of elite species (Micro propagation) 4 hrs

Unit 4.	
Organ Culture- Anther, Embryo and Endosperm culture and their applications	
Organogenesis and Somatic Embryogenesis-Technique and applications	10
hrs	
Unit 5.	
Protoplast Culture-Isolation, regeneration and viability test, somatic hybridization, methods of protoplast fusion-Chemical and electro fusion, practical application of somatic hybridization and hybridization.	
10 hrs	
Unit 6. Seasonal variation and their significance	3
hrs	
Unit 7. In-vitro production of secondary metabolites-Techniques and significance	5
hrs	
Unit 8. Role of tissue culture in agriculture, horticulture and forestry	4
hrs	
Unit 9. Transgenic Plants	
Technique of transformation-Agrobacterium mediated and physical methods (Micro projectile and electro oration) Application of transgenic plants.	8
hrs	
Unit 10. Edible Vaccines from Plants – Banana, Watermelon	4
hrs	
Unit 11. Biotechnology and Intellectual property rights.	
Patents, trade secrets, copyright, trademark, Choice of Intellectual property (IPR) and Plant genetic resomes (PGR), GAA and TRIPS	4
hrs	

## SEMESTER V

### BTP 503- Immunology and Animal Biotechnology

**Total Hours Allotted:45 hrs**

#### PART A: Immunology

Total Hours Allotted:25 hrs

Unit 1. History and scope of Immunology.	1
hrs	
Unit 2. Types of Immunity	
Passive, Active and Acquired immunity, Hum oral, Cell Mediated Immunity	2
hrs	
Unit 3. Cell and organs of immune responses and their functions	2
hrs	
Unit 4. Antigens	
Types, hastens, epitomes and Factors influencing antigen city.	
2hrs	
Unit 5, Antibodies	
Structure, types, properties and functions of immunoglobulin, Production of antibodies.	3
hrs	

Unit 6. Complement system. Structure, Components, Properties and Functions hrs	2
Unit 7. Antigen-Antibody reaction Investor tests-Precipitation, Immunolectro -phoresis, Haemagglutination, Labeled antibody (RIA, ELISA and Immuno-fluro scent techniques) hrs	5
Unit 8 Hypersensitivity and Allergic reactions hrs	2
Unit 9. Blood cell components, ABO blood grouping Rh typing hrs	2
Unit 10. Vaccines and Immunization Passive and Active Immunization Types of Vaccines – Inactivate Attenuated and Recombinant Vaccines-Peptide and DNA Vaccines. hrs	3

#### PART-B: ANIMAL BIOTECHNOLOGY

Total Hours Allotted: 20 Hours

Unit 1. Scope of Animal Tissue Culture. hrs	1
Unit 2. Culture Media Simulating natural conditions for growth of animal cells: 1. Natural media-Plasma Clot, biological fluids tissue extract, embryo extract, Importance of Serum in media. 2. Chemical defined media. hrs	3
Unit 3. a) Primary Culture:- Cell lines, and cloning desegregation of tissue, isolation of tissue, enzyme desegregation, and mechanical desegregation. b) Secondary Culture:- Transformed animal cells and continuous cell lines. hrs	3
Unit 4. Transfect ion of animal cell lines, HAT selection Selectable Markers and Transplantations of Cultural Cells. hrs	3
Unit 5. Expression of cloned proteins in animal cell-Expression vector, over production and down stream processing of the expressed proteins. hrs	2
Unit 6. Production of vaccines in animal cells. hrs	1
Unit 7. Production and applications of monoclonal antibodies hrs	1
Unit 8, Growth factors-promoting proliferation of animal cells EGF, FGF, PDGF, IL-I, II-2, NGE and Erythropoietin. hrs	3
Unit 9. Transgenic Animals	

Techniques and Applications and Transgenic mice and sheep.

3hrs

BTP 504- Immunology and Animal Biotechnology

Total Units Allotted:15

1. Blood grouping	1 unit
2. Differential Count of WBC	2 unit
3. Widal Test and VDRL Test	2 unit
4. Dot Elisa	1 unit
5. ELISA-Demonstration	1unit
6. Ocuteriony Double diffusion (ODL0	1 unit
7. Isolation of liver parenchyma cells	3 units
8. Rocket Electrophoresis	2 units
9. Separation of Serum from blood & precipitation of immunoglobulin.	2 units

Reference: IMMUNOLOGY

1. William, E. Paul, (1989) Fundamental immunology, 2nd Edition Raven Press, New York.
2. William, R. Clark (191) The Experimental Foundations of Modern Immunology (4th Edition) John Wiley, and Sons, New York.
3. Ivan, M. Roitt (194) Blackwell Scientific Publications, London.

ANIMAL CELL BIOTECHNOLGY

1. Ian Freshney (4th Edition)
2. Buttler.
3. Elements of Biotechnology –P.K. Gupta (1st Edition-200) Rastogi Publications.

BTP 602-Palnt Biotechnology

Total Units Allotted

1. Preparation of plant culture medin-MS (1962) Nitsch (1969) and White's medium	4 Unit
2. Production of Gallus and Suspension culture	2 Unit
3. Plant protoplast Isolation	2 Unit
4. Plant propagation through Tissue culture (shoot tip and Nadal culture)	4 Unit
5. Preparation of Synthetic Seeds.	1Unit
6. Anther Culture	2 Unit

**Reference: PLANT BIOTECHNOLOGY**

1. Ravishankar G.A. and Venkataraman L.V. (197) Biotechnolgy Applications of plant Tissue & culture. Oxford & IBH Publishing Co, Pvt. Ltd.
2. Bhan (1998) Tissue Culture, Mittal Publications, New Delhi.
3. Islan A.C (1996) Plant Tissue Culture, Oxford & IBH Publishing Co. Pvt. Ltd.
4. Lydiane Kyte & John Kelyn (1996) Plants from test tubes. An introduction to Micropropogation Edition) Timber Press, Partland.
5. Kumar H.D. (1991) A text book on Biotechnology (2nd Edition) Affiliated East West Press Priva Ltd. New Delhi.
6. Chrispcel M.J. and Sdava D.E. (1994) Plants, Genes and Agriculture. Jones and Barlett Publisher Boton.
7. Reinert J. and Bajaj Y.P.S. (197) Applied and Fundamental Aspects of Plant Cell, Tissue, and Orga Culture, Narosa Publishing House.

SEMESTER VI

BTP 603- Industrial Biotechnology

Total Hours Allotted: 45 Hrs

Unit 1. Introduction to industrial Biotechnology, basic principles of fermentation technology	1hr
Unit 2. Screening and Islam on of Microorganisms, maintenance of strains, strain improvement (Mutant Selection, Recombinant DNA methods).	2 hrs
Unit 3. Fermentation Media Natural and Synthetic Medic Sterilization techniques-Hent, Radiation and Filtration methods.	2 hrs
Unit 4. Fomenters Process of Aeration, Agitation, Temperature regulation and Foam control. Types of Fermented- Typical, Airlifit, Tower and Bubble-up Fermented.	5 hrs
Unit 5. Type of Fermentatica Solid State, Submerged fomentation and continuous fermentation Immobilized enzyme and cell bioreactors.	3 hrs
Unit 7. Production of Microbial products Brief account of the following products obtained by industrial microbiological fermentation Alcohol Alcoholic Beverage-Bee Organic acid-Citric acid Antibiotic-Penicillin Amino acids-Ghutamic acid Vatamin-B12 Brief account of steroid biotransformation.	11 hrs
Unit 8. Enzyme biotechnology Characteristics of enzymes Industrially produced enzymes-analyses. Industrially uses of enzymes-Detergents, Leather, Beverage, food and pharmaceutical Bioreactors for enzyme production-stirred tank, membrane reactors and continuous flow reactors	6 hrs
Unit 9. Fermented Woods. Fermented Foods: Yoghurt, Buttermilk, Idli, Dosa, Cheese, Tempeh. Microbial Foods: Single cell proteins (SCP), Single cell oils (SCO)	5 hrs
Unit 10. Plant cell suspension culture for the production of food additives-Saffron and Capsaicin	2 hrs
Unit 11. Technique: of mass culture of Algae-Spiraling	1 hrs

Unit 12. Microbial polysaccharides and polyesters; production of xanthenes gum and polyhydroxyalkon des (PHA)  
hrs

3

### **BTP 604- Industrial Biotechnology**

Total Hours Allotted:

- |   |        |
|---|--------|
| 1. Algal and fungal culture-Spiraling, Agarics, Yeast and Aspergillums.                               | 4 Unit |
| 2. Estimation of citric acid from Aspergillums Culture.   | 2 Unit |
| 3. Estimation of lactic acid and lactose.   | 3 Unit |
| 4. Immobilization of Yeast cells.   | 1 Unit |
| 5. Preparation of wine.   | 2 Unit |
| 6. Estimation of Alcohol by Specific gravity method.  | 1 Unit |
| 7. Immobilization of enzymes-(Inverses can be obtained from yeast cells and observed for production). |        |

#### **Reference: DUSTRIAL BIOTECHNOLOGY**

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4. Prescott & Dum (1987) Industrial Microbiology 4th Edition, CBS Publishers & Distrbutiors,
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6. Creueger W. & Crueger A. (2000) A Text of Industrial Microbiology, 2nd Edition, Panima Publishers corp.
7. Stanbury P.F, Whitaker H. Hall S.J. (19978) Principle of Fermentation Technology Aditya Book Ltd.

### **I Semester Department of Biotechnology Examination, Nov/Dec. 2007 (Semester Scheme)**

#### **BIOTECHNOLOGY (Paper – I) Cell Biology and Genetics**

Time: 3 Hours

Max. Marks: 60

**Instruction : Draw neat and labeled diagrams wherever necessary.**

#### **SECTION – A**

I. Answer the following:

**(5X2=10)**

1. What are microtubules?
2. What is heterochromatin?
3. Define cell cycle.
4. What is Chargaff's equivalence rule?
5. Define point mutation.

#### **SECTION – B**

II. Answer **any four** of the following:

**(4X5=20)**

6. Describe the structure of Lamp brush chromosome.



7. Turner's syndrome.
8. Distinguish between spontaneous mutations and induced mutations. Give two examples.
9. Explain the Fluid Mosaic model of plasma membrane with labeled diagram.
10. Explain coupling and repulsion hypothesis.

SECTION – C

III. Answer **any three** of the following: **(3X10=30)**

11. Give an account of structure, chemical composition and functions of nucleus.
12. Explain Watson and Crick's double helix model of DNA with the help of neat labeled diagram.
13. What is multiple allelism? Explain with reference to blood groups in human beings. A man with blood group 'A' marries a woman with blood group 'B'. What will be the blood groups of their children if both the parents are heterozygous.
14. Give a detailed account of meiotic prophase.
15. What are chromosomal aberrations? Explain in detail about structural aberrations.

**II SEMESTER B.Sc. Examination, June 2008**

**(Semester Scheme)**

**BIOTECHNOLOGY – II**

**Microbiology and Biostatistics**

Time: 3 Hours

Max Marks: 60

**Instruction** : Part – I and Part – II must answered in **separate** answer booklets.

PART – I

**(Microbiology)**

SECTION – A

I. Answer the following: **(4X2=8)**

- 1) Endospore staining
- 2) Structure of TMV
- 3) Distinguish between pathogen and parasite
- 4) UV-rays.

SECTION – B

II. Answer **any two** of the following: **(2X6=12)**

- 5) Asexual reproduction in algae
- 6) Bacterial photosynthesis
- 7) Prevention of Tuberculosis.

SECTION – C

III. Answer **any two** of the following: **(2X10=20)**

- 8) What are the symptoms of pneumonia? Explain the nature of causative agent.
- 9) Explain glycolysis with different enzymes involved in the pathway. Mention total number of ATP produced at the end of glycolysis.
- 10) Explain the structure and composition of bacterial cell wall.
- 11) Write short notes on
  - a) Capsule
  - b) Phenols
  - c) TEM

d) Branches of microbiology

PART – II  
**Biostatistics**

**Instruction :** All questions carry equal marks.

Answer any four questions.

(4X5=20)

1. Lives or two models of refrigerators in a survey are as follows. Suggest which model to be purchased?

Life Time (In years)	MODEL-A	MODEL-B
0-2	05	02
2-4	16	07
4-6	13	12
6-8	07	19
8-10	05	09
10-12	04	01

2. In a sample of 1,000 cases, the mean marks scored in a certain test is 14 with standard deviation of 2.5. Assume the distribution to be normal find

i) How many students scored between 12 and 15?

ii) How many students scored exactly 16?

iii) How many students scored between 10 and 14?

3. The following data gives number of deaths took place due to road accident during last month in a city. Represent the data by histogram and hence find mode.

<b>No. of deaths</b>	0-3	3-6	6-9	9-12	12-15	15-18
<b>No. of days</b>	02	05	08	07	06	03

4. The result of an investigation to measure the effect of vaccination of laboratory animal against a particular disease is given below. Test the hypothesis that vaccination is not effective.

	GOT DISEASE	DID NOT GET DISEASE
<b>VACCINATED</b>	45	70
<b>NOT VACCINATED</b>	65	20

5. Find mean, median and standard deviation from the following data:

<b>CI</b>	0-4	4-8	8-12	12-16	16-20	20-24	24-28	28-32
<b>Frequency</b>	08	09	12	07	05	04	03	02

6. Explain the following:

i) Type I and Type II error.

ii) Null and alternate hypothesis.

**III Semester B.Sc. Examination, November/December 2008**

(Semester Scheme)

**BIOTECHNOLOGY – II**

**Biochemistry and Biophysics**

Time: 3 Hours

Max. Marks: 60

**Instructions:** i) Part I and Part II must be answered in separate booklets.

ii) Draw the structures and labeled diagrams **wherever** necessary.

PART – I

**(Biochemistry)**

SECTION – A

I. Answer **any four** of the following: **(4X2=8)**

1. Primary structure of proteins.
2. Active centre of enzyme.
3. Sanger's reagent.
4. Structure of tristearin.
5. Steroid hormones.

SECTION –B

II. Answer **any two** of the following: **(2X6=12)**

- 6) Explain quaternary structure of proteins with an example.
- 7) What are sugar phosphates? Write the structure of any two.
- 8) Explain the properties of amino acids.

SECTION – C

III. Answer **any two** of the following: **(2X10=20)**

- 9) How are enzymes classified? Explain with examples.
- 10) Explain the importance of vitamins. Add a note on their dietary source.
- 11) Explain the properties of lipids and add a note on saponification and rancidity.
- 12) Write the structure of starch. Explain carbohydrates as energy source.

PART – II

**(Biophysics)**

SECTION – A

I. Answer **any two** of the following: **(2X5=10)**

- 1) List out the differences between ionic and covalent bonds.
- 2) Explain the importance of pH and buffers.
- 3) Write the principle and applications of GLC.

SECTION – B

II. Answer **any one** of the following: **(1X10=10)**

- 4) Explain X-ray crystallography and NMR.
- 5) Describe the methods of measuring radio activity.

**IV Semester B.Sc. Examination, June 2008**

**(Semester Scheme)**

**BIOTECHNOLOGY – IV**

**Molecular Biology**

Time : 3 Hours

Max. Marks : 60

**Instruction:** Draw neat and labeled diagrams **wherever** necessary.

SECTION – A

I. Answer the following: **(5X2=10)**

- 1) Function of RNA
- 2) 'A' form the DNA
- 3) Genetic code
- 4) -10 box

5) SD sequence.

SECTION – B

II. Answer **any four** of the following: (4X5=20)

- 6) Explain the activation of amino acid by amino acyl t-RNA synthetase enzyme.
- 7) What are transposable elements? Explain recombination in maize by transposons.
- 8) Explain excision and mismatch repair mechanism.
- 9) Differentiate the eukaryotic RNA from prokaryotic RNA.
- 10) Explain Griffith's experiment on transformation.

SECTION – C

III. Answer **any three** of the following: (3X10=30)

- 11) Write briefly about the replication of DNA.
- 12) Explain the mechanism of translation in prokaryotes.
- 13) What is cytoplasmic DNA? Explain in detail about cytoplasmic and mitochondrial genome.
- 14) With the help of neat and labelled diagram explain the structure and function of all types of RNA.

**V Semester B.Sc. Examination, Nov./Dec. 2007**

**(Semester Scheme)**

**BIOTECHNOLOGY – V**

**Genetic Engineering and Environmental Biotechnology**

Time: 3 Hours

Max. Marks: 60

**Instructions:** Draw neat and labelled diagrams **wherever** necessary.

SECTION – A

I. Answer the following: (5X2=10)

- 1) Bioleaching
- 2) PCR
- 3) Reverse transcriptase
- 4) VAM
- 5) Conventional fuel.

SECTION – B

II. Answer **any four** of the following: (4X5=20)

- 6) What are plasmid vectors? Explain with examples.
- 7) Explain the role of gene libraries in genetic engineering.
- 8) Explain different hybridization techniques.
- 9) Write short note on biopesticides and their mode of action.
- 10) Explain biomining with suitable examples.

SECTION – C

III. Answer **any three** of the following:

- 11) Explain the procedure of screening and detection of recombinant cells.
- 12) Discuss in detail about various gene transfer techniques.
- 13) Explain the application of r-DNA techniques in human health.
- 14) What are Xenobiotic compounds? Explain the degradation of pesticides.
- 15) Write a detailed account on primary, secondary and tertiary treatment of effluents.

**V Semester B.Sc. Examination, Nov./Dec. 2007**

**(Semester Scheme)**  
**BIOTECHNOLOGY – VI**  
**Immunology and Animal Biotechnology**

Time: 3 Hours

Max. Marks: 60

**Instruction:** Draw **neat** and labeled diagram **wherever** necessary.

SECTION – A

I. Answer the following: **(5X2=10)**

- 1) Humoral immunity
- 2) Epitopes
- 3) DNA vaccine
- 4) PDGF
- 5) Transformed cells.

SECTION – B

II. Answer any **four** of the following: **(4X5=20)**

- 6) What are T-cells? Explain types of T-cells.
- 7) Give an account on antigens and antibodies present in ABO blood groups. Add a note on Rh factor.
- 8) What is hypersensitivity? Explain Type-I hypersensitivity in detail.
- 9) What is erythropoietin? Explain its role as a growth factor.
- 10) Recombinant vaccines.

SECTION – C

III. Answer **any three** of the following: **(3X10=30)**

- 11) Name the invitro tests for antigen and antibody reaction, and explain any three tests in detail.
- 12) Describe the structure of antibody molecule. Explain in detail about IgM.
- 13) What are lymphoid organs? Give an elaborate account of primary and secondary lymphoid organs.
- 14) What are genetically modified animals? Explain the techniques involved in generating a transgenic mice and add a note on its significance.
- 15) Describe the physicochemical properties of media used in animal tissue culture.

**VI Semester B.Sc. Examination, June 2008**

**(Semester Scheme)**  
**BIOTECHNOLOGY – VIII**  
**Industrial Biotechnology**

Time : 3 Hours

Max. Marks: 60

**Instruction :** Draw neat labeled diagram **wherever** necessary.

SECTION – A

I. Answer the following: **(5X2=10)**

- 1) Lyophilization.
- 2) Baffles.
- 3) Batch sterilization.
- 4) Continuous Fermenters.
- 5) Maintenance of strain.

SECTION – B

- II. Answer **any four** of the following: (4X5=20)
- 6) Explain the production of Saffron.
  - 7) Explain the steps involved in the production of citric acid.
  - 8) Give an account on Air Lift Fermenters.
  - 9) Briefly explain different types of sparger.
  - 10) Write a note on rotary vacuum filter.

SECTION – C

- III. Answer **any three** of the following. (3X10=30)
- 11) Draw a neat diagram of fermenter, describe its parts and its body construction.
  - 12) Describe the different methods of isolating a micro-organism and screening of microbes.
  - 13) Explain the steps involved in the production of Alcohol.
  - 14) Write short notes on:
    - a) Enzymes used in Pharmaceutical Industry.
    - b) Drying.
  - 15) Give an account on:
    - a) Industrially produced enzymes.
    - b) Single cell protein.

**VI Semester B.Sc. Examination, June 2008**  
**(Semester Scheme)**  
**BIOTECHNOLOGY – VII**  
**Plant Biotechnology**

Time : 3 Hours

Max. Marks : 60

**Instruction : Draw neat and labeled diagrams wherever necessary.**

SECTION – A

- I. Answer the following: (5X2=10)
- 1) Secondary metabolite.
  - 2) Anther culture.
  - 3) Embryogenesis.
  - 4) Patent.
  - 5) Gibberellins.

SECTION – B

- II. Answer **any four** of the following: (4X5=20)
- 6) Discuss the applications of somaclonal variations.
  - 7) Write a brief note on techniques and applications of endosperm culture.
  - 8) Give an account of techniques used for the sterilization of explants under in vitro conditions.
  - 9) Discuss the process of plant genetic transformation by Ti-plasmid.
  - 10) Discuss the role of tissue culture in horticulture.

SECTION – C

- III. Answer **any three** of the following: (3X10=30)
- 11) Discuss the method of isolation, fusion and regeneration of protoplasts.
  - 12) Elucidate the techniques and applications of somatic embryogenesis. Write a brief note on synthetic seeds.

13) What are Secondary Metabolites? Discuss the techniques used for the production of secondary metabolites under in vitro conditions.

14) What is Plant Tissue Culture? Highlight the applications of Plant Tissue Culture.

**Department of Biotechnology**  
**I Semester M.Sc. Degree. Examination, January 2007**  
**(New Syllabus Scheme)**  
**BIOTECHNOLOGY**

Paper – BTP 101 : Cell Biology

Time : 3 Hours

Max. Marks : 80

SECTION – A

Write brief notes on **any five** of the following: **(5X3=15)**

1. Neuron
2. Membrane lipid
3. Platelets
4. cAMP
5. Acetylcholine
6. Apoptosis
7. Morphogenetic movements

SECTION – B

Answer **any four** of the following: **(4X5=20)**

8. Describe the role of leukocytes in immune
9. Outline the structure of membrane proteins.
10. Explain the role of endocytosis in bulk transport.
11. Explain the mechanism of cell-cell adhesion.
12. Write an account on the role of myosin and actin in muscle contraction.
13. Elaborate on the process of spore formation in plants.

SECTION – C

Answer **any three** of the following: **(3X15=45)**

14. Describe the structure and organization of cell wall and its significance.
15. Explain in detail the role of membranes in active and passive transport.
16. Discuss in detail the different cell junctions. Add a note on their role in intercellular communications.
17. Describe the structure of cilia and flagella. Add a note on their functions.
18. Describe the role of cyclins and protein kinases in the regulation of cell cycle.

**Department of Biotechnology**  
**Government Science College, Bangalore – 560 001**  
**I M.Sc. I Semester Preparatory Examination Jan 2008**  
**BTP 102 GENETICS**

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Time : 3 hours

Max. Marks 80

SECTION A

Answer any FIVE of the following 5X3=15

1. telomeres

2. Euchromatin
3. Unequal crossing over
4. Ac-Ds System in Maize
5. Luria-Delbruck Fluctuation Test
6. Dosage Compensation
7. Speciation

SECTION B

Answer any FOUR of the following 4X5=20

8. Describe the organization of nucleosome
9. Gene Mapping for quantitative traits
10. Retrotransposons
11. Methods of epigenetic inheritance
12. Mitochondrial gene mutations in human beings
13. Discuss Kp-Alu elements in human genome

SECTION C

Answer any THREE of the following 3X15=45

14. Explain the molecular basis of mutations and their role in evolution.
15. Highlight the molecular and phylogenetic evolution of homologous genes
16. Give an account of structure and importance of transposable elements in Bacteria and Yeast
17. Briefly explain the genomes of *Arabidopsis* and *Drosophila*.
18. Describe sex determination in mammals and *Drosophila*.

**I Semester M.Sc. Degree Examination, January 2008**

**(New Scheme)**

**BIOTECHNOLOGY**

**BTP – 104: Biomolecules**

Time: 3 Hours

Max. Marks: 80

SECTION – A

Write brief notes on **any five** of the following: **(5X3=15)**

1. Flavonoids.
2. Sialic acids.
3. Triple helix.
4. Lecithin.
5. UV absorption spectra of amino acids.
6. Hyper chromicity of DNA.
7. Peptide bond.

SECTION – B

Answer **any four** of the following: **(4X5=20)**

8. Discuss the bonds involved in the maintenance of secondary structure of proteins.
9. Discuss acid-base properties of amino acids.
10. Explain Ramachandran's plot.
11. Discuss ionic product of water and the concept of pH.
12. Write a note on Beer-Lambert's law and its applications.
13. Describe the structure of tRNA.



SECTION – C

Answer **any three** of the following: (3X15=45)

14. Describe the A and Z forms of DNA. Elucidate the differences between A, B and Z forms.
15. Describe the structure and functions of polysaccharides. Add a note on the differences between starch and glycogen.
16. Discuss the principle, types and applications of electrophoresis.
17. Explain the technique of X-ray crystallography and its applications.
18. Elaborate on the classification and properties of lipids.

**Department of Biotechnology, Government Science College**  
**I M.Sc. II Semester, Preparatory Examination**  
**BTP 201 BIOCHEMISTRY**

Time 3 hours

Max. marks-80

SECTION A

Answer **any five** of the following 5X3=15

1. Free energy change.
2. Active site.
3. Active spectrum.
4.  $\beta$ -Oxidation.
5. L-B plot.
6. Ketone bodies.
7. Oxidative steps in glycolysis.

SECTION B

Answer **any four** of the following 4X5=20

8. Explain the mechanism of ETC.
9. Explain the process of transamination & deamination with suitable example.
10. Derive M.M. equation.
11. Describe CAM pathway.
12. Explain the role of carnitine in the oxidation of fatty acids.
13. Describe gluconeogenic pathway.

SECTION C

Answer **any three** of the following 3X15=45

14. Describe in detail the Krebs's cycle.
15. Describe the mechanics of enzyme regulation.
16. Give an account of the biosynthesis of saturated fatty acids.
17. Explain the role of photosynthetic pigments.
18. Explain the biosynthesis of androgens.

**II Semester M.Sc. Degree Examination, June 2009**  
**(New Scheme)**

**BIOTECHNOLOGY**

**BTP – 203 : Immunology and Immunotechnology**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Write brief notes on **any five** of the following: (5X3=15)

1. Rh incompatibility.
2. Effector mechanisms.
3. HLA systems.
4. Adjuvant.
5. Interferons.
6. Plantibodies.
7. Antigens.

SECTION – B

Answer **any four** of the following:

**(4X5=20)**

8. Explain immune responses.
9. Describe the structure of MHC – 1 molecule.
10. Write a note on tumor markers.
11. Explain with example the immunity to bacterial infections.
12. Explain the assay methods of lymphokines and cytokines.
13. Write a note on immunization programmes in India.

SECTION – C

Answer **any three** of the following:

**(3X15=45)**

14. Write an account on the various cells involved in immune system.
15. What is a complement? Explain complement and their pathways with their biological consequences.
16. Describe autoimmune diseases and their treatment.
17. Write a detailed account on Anaphylaxis.
18. Give an account on conventional vaccines.

**III Semester M.Sc. Degree Examination, Nov./Dec. 2007**

**(New Syllabus)**

**BIOTECHNOLOGY**

**BTP 301 : Plant Biotechnology**

Time: 3 Hours

Max. Marks: 80

SECTION – A

Write brief notes on **any five** of the following:

**(5X3=15)**

1. Plant tissue culture certification
2. Micronutrients
3. Binary vector
4. Random primer
5. Electroporation
6. Osmogenes
7. Polyhydroxyalkoanates.

SECTION – B

Answer **any four** of the following:

**(4X5=20)**

8. Explain the advantages of micropropagation.
9. Write about the technique of cryopreservation.
10. Write a brief account on chloroplast transformation.
11. Discuss the significance of rice genome project.
12. Write a note on heat shock proteins.

13. Explain the current status of transgenic plants in India.

SECTION – C

Answer **any three** of the following: (3X15=45)

14. Describe the technique of somatic hybridization and its significance.
15. Explain the methodology for selecting and screening of transgenics for herbicide resistance in plants.
16. Discuss the recent methods of genomic studies in plants.
17. Discuss the strategies for yield improvement in plants using transgenic plants.
18. Explain the technology for production of therapeutic proteins in plant cells.

**III Semester M.Sc. Degree Examination, November/December 2007**

(New Scheme)

**BIOTECHNOLOGY**

**BTP 303 : Genetic Engineering**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **any five** of the following: (5X3=15)

1. Paliandromes
2. Multiple cloning sites
3. Plasmid amplification
4. DNA fractionation
5. Transformation efficiency
6. P<sup>32</sup> labelling
7. Maxam Gilbert sequencing.

SECTION – B

Answer **any four** of the following: (4X5=20)

8. Give the characteristics of an ideal vector.
9. Write an account on yeast selection markers.
10. Describe the importance of T<sup>7</sup> and TaC promoters in cloning.
11. Explain purification of mRNA.
12. Describe transformation mechanism by calcium phosphate.
13. Elaborate on radioactive methods to identify target mRNA from total mRNA preparation.

SECTION – C

Answer **any three** of the following: (15X3=45)

14. Describe the characteristics and functions of various enzymes employed in recombinant DNA work.
15. Describe in detail the methodology of gene library construction.
16. Describe the principles and applications of Agrobacterium, gene gun and electroporation methods for gene transfer.
17. Explain labeling by adopting nick translation and random priming methods. Add a note on non-radioactive labeling.
18. Describe the principle and experimental outlay for conducting western blot.

**III Semester M.Sc. Degree Examination, November/December 2007**

(New Scheme)

**BIOTECHNOLOGY**

## BTP – 302: Animal Biotechnology

Time: 3 Hours

Max. Marks: 80

### SECTION –A

Write brief notes on **any five** of the following: **(5X3=15)**

1. E.G.F.
2. Homeostasis.
3. Cell line.
4. Stem cells.
5. Lipofection.
6. Super ovulation.
7. Cell-synchronization.

### SECTION –B

Answer **any four** of the following: **(4X5=20)**

8. Present a critical note on serum-free culture media and its applications in tissue culture.
9. Write an account on pre-implantation genetic diagnosis.
10. Explain the methods of cloning in animal systems.
11. Explain the importance of gonadotropin releasing hormones in the regulation of reproduction in human.
12. “Silkworm is an invaluable bioreactor”. Comment.
13. Describe the production of proteins for pharmaceutical use employing transgenic animals.

### SECTION – C

Answer **any three** of the following: **(3X15=45)**

14. Give an account of measurement of viability any cytotoxicity.
15. Explain the process of in vitro fertilization and embryo transfer technique.
16. What are the various approaches for scaling up of monolayer culture? Discuss the advantages and limitations.
17. Describe in details the procedure involved in producing transgenic mice.
18. Explain in detail cloning of sheep. Comment on the current status animal cloning experiments.

**III Semester M.Sc. Degree Examination, November/December 2007**

**(New Scheme)**

## **BIOTECHNOLOGY**

### **BTP-304 : Environmental Biotechnology**

Time : 3 Hours

Max. Marks: 80

### SECTION – A

Write brief notes on **any five** of the following: **(5X3=15)**

1. Xenobiotic compounds
2. Anaerobic sludge.
3. CETP
4. Biofuels
5. Ex situ Bioremediation
6. De-lignification
7. GMOs

### SECTION – B

Answer **any four** of the following: **(4X5=20)**

8. Enumerate air pollution and explain the various methods of measuring air pollution.
9. Explain the process of bioretrieving rare metals from ores.
10. Write about the aerobic processes involved in water treatment.
11. Explain the process involved in the reduction of organochlorine compounds.
12. Write about the methods used in pulp bleaching.
13. Discuss the impacts of green house effect and acid rain.

SECTION – C

Answer **any three** of the following: **(3X15=45)**

14. Describe the role of biotechnology in the conservation of biodiversity.
15. Explain the process involved in the production of oils and fuels from wood waste.
16. Explain the use of microbes in bioremediation of Xenobiotics.
17. Explain the use of reverse osmosis and ultrafiltration in the treatment of industrial effluents.
18. Write a note on bioindicators of environmental pollution and explain their applications.