# SRI KRISHNADEVARAY UNIVERSITY:: ANANTAPURAMU

**UG CBCS SYLLABUS**
**VI Semester**
**(2017-2018)**

# B.Sc., BIO-TECHNOLOGY

**VI SEMESTER- SYLLABUS**

**(AS PER CBCS AND SEMESTER SYSTEM)**

**III YEARS**

**w.e.f. 2017-2018**

## AP STATE COUNCIL OF HIGHER EDUCATION
## CBCS - PATTERN FOR BIO-TECHNOLOGY

# B.Sc., BIO-TECHNOLOGY VI SEMESTER- SYLLABUS

## III YEAR – VI SEMESTER

### Paper – VII: Elective – A

**BTT- 601: ANIMAL AND PLANT BIOTECHNOLOGY**

**Total: 56 hrs (3h /week)**

**UNIT I:** **16 h**

**Animal cell and plant tissue culture:** Introduction to animal cell culture and plant tissue culture laboratory facilities. Animal cell and plant tissue culture media (composition & preparation), sterilization. Role of growth factors in plant tissue culture.

**UNIT II:** **12 h**

**Various techniques of animal cell and plant tissue culture**: Characteristics of animal cells in culture: Contact inhibition, anchorage dependence. Stem cells and their applications. Types of animal cell culture: Primary culture, secondary, subculture, suspension and cell lines. Maintenance of cell lines in the laboratory.

**UNIT III:** **10 h**

**Plant tissue:** Micropropagation or clonal propagation, production of haploids, protoplast culture and somatic hybridization. Cloning in plants with Ti- plasmid. Concept of transgenic plants (Bt cotton and other transgenic plants) and applications.

**UNIT IV:** **10 h**

**rDNA products:** Brief idea about recombinant DNA products in medicine (insulin, somatostatin, vaccines), Concept of Gene therapy, Production of recombinant vaccines – hepatitis. Concept of transgenic animals: *In vitro* fertilization and embryo transfer in humans and farm animals (e.g., Doly).

**UNIT V:** **8 h**

**IPR:** Intellectual property rights. Protection of Copy rights. Patents and their significance. Management studies: society and ethical aspects of Biotechnology.

**PRACTICALS: BTP- 602 ANIMAL AND PLANT BIOTECHNOLOGY (2 h /week)**

1. Preparation of Plant tissue culture media (MS medium).
2. Cell count by hemocytometer.
3. Induction of Callus & Regeneration of plant.
4. Establishing primary cell culture of chicken embryo fibroblasts.
5. Animal tissue culture – maintenance of established cell lines.
6. Micropropagation of plant.
7. Measurement of cell size.
8. Microphotography.
9. IMViC test.
10. Determination of seed viability.

Note: Minimum of 6 practicals should be performed.

**(Wherever wet lab experiments are not possible the principles and concepts can be demonstrated through any other material or medium including videos/ virtual labs etc.)**

**RECOMMENDED BOOKS**


1. Lasley JF. Genetics of Livestock Improvement
2. Text book of Animal Biotechnology by B Singh. The Energy and Resources Institute (teri)
3. Ross CV. Sheep Production and Management. Prentice Hall
4. Schmidt GM & Van Vleck LD. Principles of Dairy Science. WH Freeman
5. Turner HN & Young SSY. Quantitative Genetics in Sheep Breeding. MacMillan
6. Van Vleck LD, Pollak EJ &Bltenacu EAB. Genetics for Animal Sciences. WH Freeman
7. Crawford RD. Poultry Breeding and Genetics. Elsevier
8. Singh RP &KumarJ. Biometrical Methods in Poultry Breeding. Kalyani
9. Plant Tissue Culture and its Biotechnological Applications By W. Barz, E. Reinhard, M.H. Zenk
10. Plant Biotechnology – H S Chawla
11. Plant Tissue Culture By Akio Fujiwara
12. Frontiers of Plant Tissue Culture By Trevor A. Thorpe
13. Plant Tissue Culture : Theory and Practice By S.S. Bhojwani and A. Razdan
14. Plant Cell, Tissue and Organ Culture, Applied and Fundamental Aspects By Y.P.S. Bajaj and A. Reinhard
15. Biotechonology by U. Sathyanarayana

# B.Sc., BIO-TECHNOLOGY VI SEMESTER- SYLLABUS

## B. Sc. III – Semester VI (Cluster A1 Elective)

### BTT 605 METABOLISM AND GENETICS (VIII A1 Elective)

**Total: 60 h (3 h/week)**

**UNIT I: Carbohydrate metabolism** **12 h**

Glycolysis, Citric acid cycle, Electron transport chain, Gluconeogenisis and HMP shunt.

**UNIT II: Amino acid and Lipid metabolism**
**12 h**

Deamination, transamination & Decarboxylation of amino acids. Aromatic amino acid's Catabolism (Phenylalanine and tyrosine). β- Oxidation of fatty acids and fatty acid synthesis.

**UNIT III: Mendel's Experiments**
**12 h**

Mendel's Experiments – Laws of Segregation, Purity of gamates & Independent assortment. Deviations of Mendel's Laws - Partial or incomplete dominance, Codominance, Penetrance, Expressivity, Pleotropis, pleiotropism, Recessive and Dominant gene interactions.

**UNIT IV:** **12 h**

Gene mutation- Spontaneous and induced- Point and Frame shift. DNA Damage and DNA Repair- Excision repair and mismatch repair.

**UNIT V** **12 h**

Giant Chromosomes – Polytene & Lamp brush. Cell cycle and Cell division, Apoptosis.

**PRACTICALS BTP 606: GENETICS (Elective Lab)**

1. Study of different phases of mitosis in onion root tips and meiosis in *Allium cepa* flower buds.
2. Chromosome staining.
3. Determination of multiple allele frequencies of leaf scars in Trifolium.
4. Monohybrid and Dihybrid ratio in Drosophila or Maize (Models / Problems).
5. Determination of linkage and calculation of recombination frequencies (maize/ Drosophila).
6. Induction of chromosomal aberrations by chemical mutagenesis in Allium (or any plant).
7. Isolation of auxotrophic mutants (plants or insects).
8. Repair of DNA by Photo activation of Photolyase in bacteria.
9. Mutation of bacteria by UV light.
10. Chemical induced mutation in bacteria
11. Stages in Mitosis
12. Stages in Meiosis.

Note: Minimum of 8 practicals should be performed.

**(Wherever wet lab experiments are not possible the principles and concepts can be demonstrated through any other material or medium including videos/virtual labs etc.)**

**Recommended Books:**


1. Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley & Sons. Inc.
2. Cooper, G.M. and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5th edition. ASMPress & Sunderland, Washington, D.C.; Sinauer Associates, MA.
3. Gardner, E.J., Simmons, M.J., Snustad, D.P. (2006). Principles of Genetics. VIII Edition John Wiley & Sons.
4. Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wiley and Sons Inc.
5. Russell, P. J. (2009). Genetics- A Molecular Approach. III Edition. Benjamin Cummings.
6. Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. IX Edition. Introduction to Genetic Analysis, W. H. Freeman & Co.

## B.Sc., BIO-TECHNOLOGY VI SEMESTER- SYLLABUS

### B. Sc. III – Semester VI (Paper VIII: Cluster Elective A2)

**BTT: 607 Industrial Biotechnology** **Total: 50 h (3h /week)**

**Unit I**: 10 h

Isolation, screening and preservation of industrially important microorganisms. Synthetic and natural medium, antifoams, sterilization methods and inoculum preparation.

**Unit II**: 10 h

Definition of bioreactor, basic principles of bioreactor. Classification of bioreactors. Analysis of batch, continuous, fed batch and semi-continuous bioreactors.

**Unit III:** **10** h

Ethanol Production by Fermentation using Molasses, Starchy Substances. Production of Alcoholic Beverages like Beer and Wine. Production of Citric Acid by Submerged and Solid State Fermentations.

**Unit IV**: 10 h

Sources of Industrial Enzymes, Production of Microbial Enzymes like Amylase and protease. Backer's Yeast and SCP Production. Production of Antibiotics: Penicillin.

**Unit V:** **10** h

Biotechnology Products- Production of recombinant proteins having therapeutic and diagnostic applications (Insulin, Growth Hormone, Recombinant vaccines, Monoclonal Antibody).

**PRACTICALS BTP: 608 Industrial Biotechnology (2 h /week)**

1. Isolation of industrially important microorganisms from soil.
2. Isolation of amylase producing organisms from soil.
3. Production of α – amylase from *Bacillus Spp.* by shake flask culture.
4. Production of alcohol or wine using different substrates.
5. Estimation of alcohol by titrimetry.
6. Estimation of alcohol by calorimetric method.
7. Production of citric acid.
8. Citric acid production by submerged fermentation.
9. Estimation of citric acid by titrimetry.

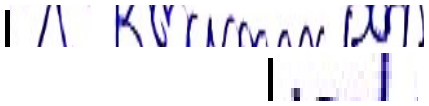
Note: Minimum of 5 practicals should be performed.

**(Wherever wet lab experiments are not possible the principles and concepts can be demonstrated through any other material or medium including videos/ virtual labs etc.)**

**Recommended Books**


1. Bioprocess Engineering - By Shuler (Pearson Education)
2. Text Book of Biotechnology - By H.K. Das (Wiley Publications)
3. Biotechnology -By H.J. Rehm and G. Reed. VIH Publications, Germany
4. Biogas Technology - By b.T. Nijaguna
5. Biotechnology - By K. Trehan
6. Industrial Microbiology - By L.E. Casida
7. Food Microbiology - By M.R. Adams and M.O. Moss
8. Introduction to Biotechnology - By P.K. Gupta
9. Essentials of Biotechnology for Students - By Satya N. Das
10. Biotechnology, IPRs and Biodiversity - By M.B. Rao and Manjula Guru (Pearson Education)
11. Essentials of Biotechnology - By Irfan Ali Khan and AtiyaKhanum (Ukaaz Publications)

**12.** Bioethics – Readings and Cases - By B.A. Brody and H. T. Engelhardt. Jr. (Pearson Education)



# B.Sc., BIO-TECHNOLOGY VI SEMESTER- SYLLABUS

## B. Sc. III – Semester VI (Paper VIII: Cluster Elective A3)

**BTT: 609 ENVIRONMENTAL BIOTECHNOLOGY**

**Total: 56 h (3h /week)**

**Unit I**: **Ecosystem** **10 h**

Principles of Ecology**,** Bio-geo chemical cycles – Carbon and Nitrogen cycles. Role of microbes in bio-geochemical cycles.

**Unit II: Environmental Pollution** **10 h**

Introduction to environment and pollution. Sources of pollution – domestic waste, agricultural waste, industrial effluents and municipal waste. Inorganic and Organic pollutants of air, land and water and prevention of pollution.

**Unit III**: **Bioenergy and Bio-fuels** **10 h**

Renewable and non- renewable energy resources. Conventional energy sources and their impact on environment. Non-conventional fuels and their impact on environment. Production of biofuels:- biomethane, biohydrogen

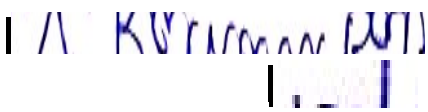
**Unit IV**: **Waste water management** **10 h**

Types of pollutants in water. Aerobic and anaerobic treatment, primary, secondary, tertiary treatment of municipal wastes and Solid waste management

**Unit V**: **Bioremediation and Restoration of Environment** **16 h**

Introduction to Bioremediation. Microbial bioremediation of pesticides. Microbial degradation of pesticides and toxic chemicals. Biopesticides and Biofertilizers (Nitrogen fixing, phosphate solubilizing microorganisms)

**BTP 610: Project work:** Project work should be carried out by student in any field/topic which is covered during the course.



**Suggested Books:**


1. Environmental Science, S.C. Santra
2. Environmental Biotechnology, Pradipta Kumar Mohapatra
3. Environmental Biotechnology – Concepts and Applications, Hans-Joachim Jordening and Jesef Winter
4. Waste Water Engineering, Metcalf and Eddy, Tata McGraw hill
5. Agricultural Biotechnology, S.S. Purohit
6. Introduction to Environmental Biotechnology, Milton Wainwright
7. Principles of Environmental Engineering, Gilbert Masters
8. Wastewater Engineering – Metcalf & Eddy
9. Text Book of Biotechnology - By H.K. Das (Wiley Publications)
10. Biotechnology -By H.J. Rehm and G. Reed. VIH Publications, Germany
11. Biogas Technology - By B.T. Nijaguna
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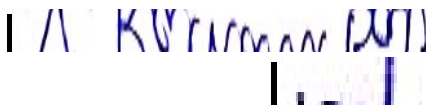

# Model Question Paper for End Semester Exam

B. Sc Degree Course (CBCS Semester pattern)

# B. Sc Biotechnology

Time : 3 Hrs Max marks : 75

SECTION A (5 x 5 = 25 marks )

**Attempt any FIVE of the following**

1. Unit I
2. Unit I
3. Unit II
4. Unit II
5. Unit III
6. Unit III
7. Unit IV
8. Unit IV
9. Unit V
10. Unit V

SECTION – B (10 X 5 = 50 marks)

**Attempt all the questions**

9.

(OR) Unit I

10.

11.

(OR) Unit-II

12.

13.

(OR) Unit-III

14.

15.

(OR) Unit IV

16.

17.

(OR) Unit V

18