

2014-15

NAGARJUNA GOVERNMENT COLLEGE, AUTONOMOUS
NALGONDA
ACCREDITED BY NAAC WITH "A" GRADE



DEPARTMENT OF BIOTECHNOLOGY
syllabus & Model question papers for B. Sc I, II & III Year.

2014 - 15

**NAGARJUNA GOVERNMENT COLLEGE, NALGONDA
(AUTONOMOUS)**

ALLOCATION OF CREDITS AT SUBJECT LEVEL

College: N.GCOLLEGE

Course: B.Sc.,

Subject: BIOTECHNOLOGY

S.No.	Semester	Module(Paper)	Hours	Max. Marks	Credits
1	I(Core)	FUNDAMENTAL OF GENETICS	04	100	03
2	II (Core)	MOLECULAR BIOLOGY- BIOINFORMATICS	04	100	03
3	Practicals-1	FUNDAMENTAL OF GENETICS MOLECULAR BIOLOGY- BIOINFORMATICS	03	100	02
4	III (Core)	BIOCHEMISTRY	04	100	03
5	IV (Core)	ENZYMOLGY & BIOCHEMICAL TECHNIQUES	04	100	03
6	Practicals-2	BIOCHEMISTRY ENZYMOLGY & BIOCHEMICAL TECHNIQUES	03	100	02
7	V Advanced	MOLECULAR BIOLOGY, PLANT AND ANIMAL BIOTECHNOLOGY	04	100	03
	Advanced Elective I	ENVIRONMENTAL BIOTECHNOLOGY	03	100	02*
	Advanced Elective II	MEDICAL BIOTECHNOLOGY	03	100	02*
8	VI Applied	GENETIC ENGINEERING & INDUSTRIAL, ENVIRONMENTAL BIOTECHNOLOGY	04	100	03
	Applied Elective I	BIOTECHNOLOGY FOR CROP IMPROVEMENT	03	100	02*
	Applied Elective II	FOOD SCIENCE AND TECHNOLOGY	03	100	02*
	Practicals-3	MOLECULAR BIOLOGY, PLANT AND ANIMAL BIOTECHNOLOGY	03	100	02
	Practicals-4	GENETIC ENGINEERING & INDUSTRIAL, ENVIRONMENTAL BIOTECHNOLOGY	03	100	02
	TOTAL CREDITS				30
	Project Work	On the given topic		100	03
* One Elective only is compulsory in Respective Sem.					

Signature of Group members:

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NAGARJUNA GOVERNMENT COLLEGE, NALGONDA
(Autonomous)
DEPARTMENT OF BIOTECHNOLOGY
BOARD OF STUDIES MEETING

The Board of studies in the Department of Biotechnology met on Date 15-5-2014 under the chairmanship of the Board of studies and adopted the following Resolutions.

1. Introduction of Choice Based Credit System(CBCS)for I year from academic year 2014-2015
2. Each semester will have 4 units
3. To Conduct 2 (two)internal assignments 30 marks(20 marks for written examination ,5 marks for Assignment and 5 marks for Seminar)10 marks for II year and III year.
4. It is compulsory to a student to pass in internal exam and to pass in internal examination are has to secure 40% marks.
5. To conducts semester and Examination for 70 marks for I year.
6. To pass and examination are has to get a minimum of 36% of marks in each paper.
7. Conducting of I internal in the last week of August and II internal in the first week of October of the academic year.
8. To Design the question paper in following pattern:
For I year in section-A to give 5 Questions and ask the students to answer all Questions(VSA) 5x2=10,
In section-B to give 6 Questions and ask the students to answer 4 Questions (SA) 4x5=20.
In section-C to give 4 Questions with internal choice and ask the students to answer 4 Questions 4x10=40.
For II and III year in section-A to give 4 Questions with internal choice and ask the students to answer 4 Questions- 4x8=32. In section-B to give 8 questions and ask them to answer 4 Questions – 4x2=8.
9. Commencement of All Semester to prepare and supply question Banks (Description & Objective type) to the students.
10. Continuous internal assessment method to evaluate the progress of the students
11. Approved the panel of examiner for paper setting and evaluation for the year 2014-15.

1. Chairman Board of Studies:

Sri A.Ramana Rao,
In-Charge Dept of Biotechnology
N.G. College, Nalgonda.

2. University Nominee

Dr T.Sivaram, Asst.Prof.
Head Dept of Biotechnology
MGU, Nalgonda.

3. Subject expert-from out side college

1.Dr.Prem Sagar, Asst.Prof,
Dept of Biotechnology,
MGU, Nalgonda.

2.Dr.M.Ramchandani, Asst.Prof,
Dept. of Biochemistry
MGU.Nalgonda.

4. Members

The faculty
Members of the Dept.

1. G.Anjaiah, G. Anjaiah
Guest Faculty in Biotechnology
2. Ayesha Ayesha
Guest Faculty in Biotechnology

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NAGARJUNA GOVERNMENT COLLEGE, NALGONDA
(AUTONOMOUS)
B.Sc- I Biotechnology
MODULE- FUNDAMENTALS OF GENETICS

60 hrs
(4 hrs/ week)

UNIT- I Cell Structure and Function

- 1.1 Cells as basic units of living organisms
Viral, bacterial, fungal, plant and animal cells
- 1.2 Ultra structure of prokaryotic cell (Cell membrane, plasmids)
- 1.3 Ultra structure of eukaryotic cell (Cell wall, cell membrane, mitochondria, chloroplast, endoplasmic reticulum, Golgi apparatus, vacuoles).

UNIT -II Chromosome Organization and Cell Division

- 1.4 Chromosome organization in Prokaryotes and Eukaryotes
- 1.5 Structure of specialized chromosomes (Polytene and Lamp Brush)
- 1.6 Cell Division and Cell Cycle
- 1.7 Significance of mitosis and meiosis

UNIT - III Mendelism & Mendel's Laws

- 2.1 Mendel's experiments – Factors contributing to success of Mendel's experiments
- 2.2 Law of segregation – Monohybrid ratio
- 2.3 Law of Independent assortment – Dihybrids, Trihybrids
- 2.4 Deviation from Mendel's Laws - partial or incomplete dominance, co-dominance
- 2.5 Penetrance and expressivity, pleiotropism
- 2.6 Epistatic gene interaction – Modified dihybrid ratios (12:3:1; 9:7; 15:1; 9:3:4; 9:6:1; 13:3)

UNIT -IV Sex Determination & Recombination

- 2.7 Genes and environment – phenocopies
- 2.8 Linkage and recombination – Discovery of linkage, cytological proof of crossing over
Recombination frequency and map distance
Interference and coincidence
Mitotic crossing over in *Drosophila*
- 2.9 Mechanism of sex determination-genic balance theory - *Drosophila*
Homogametic and Heterogametic theory (Human, Mamalian, Birds)
- 2.10 X – linked inheritance (eg. Haemophilia)

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NAGARJUNA GOVERNMENT COLLEGE, NALGONDA
B.Sc- I Biotechnology
MODULE-MOLECULAR BIOLOGY- BIO INFOMATICS

SEMESTER-II

60 hrs
(4 hrs/ week)

UNIT- I Structure of Nucleic Acids

- 3.1 DNA as the genetic material – Griffiths experiments on transformation in *Streptococcus pneumoniae*. Avery, McEleod and Mc Carty's experiments. Hershey – Chase experiments with radio-labelled T₂ bacteriophage
- 3.2 RNA as genetic material – Tobacco Mosaic Virus
- 3.3 Structure of DNA – Watson and Crick Model
Forms of DNA – A, B and Z forms of DNA, Super coiled and related DNA – Role of topoisomerases

UNIT - II Funtions& Mechanisms of Nucleic Acids

- 3.4 DNA Replication – Models of DNA replication (Semi-conservative, non-conservative models)
Mechanisms of DNA replication – Linear and circular – Rolling circle and theta mechanism of replication
DNA damage and Repair
DNA Recombination
Reverse Transcriptase

UNIT - III Concepts of Biostatistics

- 4.1 Concept of probability, basic laws and its application to Mendelian segregation. Concept of probability distribution. Binomial and Poisson distributions, Normal distribution and their application to biology
- 4.2 Concept of sampling and sampling distribution. Concept of test of hypothesis. Applications of t-test statistics to biological problems/data: Chi-square, statistic applications in biology
- 4.3 Simple Regression and Correlation. Concept of analysis of variance (one-way classification)

UNIT -IV Concepts of Bioinfomatics

- 4.4 Introduction to Bioinformatics
Biological Databases – Nucleotide sequence and Protein databases, their utilization in Biotechnology, Storage of biological data in databanks, data retrieval from databases and their utilization

Practical Paper – I

45hrs
(4 hrs/ week)

1. Monohybrid and dihybrid ratio in *Drosophila*/maize
2. Estimation of DNA by diphenylamine method
3. Estimation of RNA by orcinol method
4. Preparation of different stages of Mitosis and Meiosis
5. Types of chromosomes
6. Finding statistical significance of a given data using 't' test
7. Graphical representation of data (Histograms, frequency polygen, Pie diagram)
8. Fitting of binomial and Poisson distributions
9. Acquaintance with the Biological databases through Internet

Recommended Books

1. Biometry - By Sokal and Rohlf W.H. Freeman
2. Fundamentals of Biometry - By L.N. Balaram (George Allen and Unwin Ltd, London
(1972)
3. Biostatistics - By N.T.J. Bailey
4. Biostatistics- Manual of biostatistical methods for use in health, nutrition and Anthropology - By K. Visweshwar Rao (Jaypee Publications).
5. Genetics - By Gardner (Macmillan Press)
6. An introduction to Genetic Analysis - By Griffith and others – Freeman and Company
7. Bioinformatics and Bioprogramming in C - By L.N. Chavali
8. Cell Biology - By S.C. Rastogi (New Age International (P) Ltd)
9. Statistical Genetics – Principles and Practice - By Prem Narain
10. Biotechnology - By K. Trehan
11. Biotechnology –I - By R.S. Setty and G.R. Veena
12. Biotechnology – II - By R.S. Setty and V. Sreekrishna
13. Fundamentals of Genetics – By B.D. Singh, N. Pratibha, P.H. Rao and P.B. Kavi Kishor
13. Genetics - By B.D. Singh
14. Genetics - By Mohan P. Arora, Gurdarshan and S. Sandhu
15. Introduction to Bioinformatics - By V. Kothekar
16. An Introduction to Kothekar - By V. Kothekar and T. Nandi
17. Introduction to Bioinformatics - By Arthur M. Lesk
18. Cell and Molecular Biology - By De Robertis
19. Cell and Molecular Biology - By Lodish
20. Cell Biology and Genetics - By P.K. Gupta
21. Theory and Problems in Genetics - By Stransfield

ANNEX
Department of Biotechnology
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NAGARJUNA GOVERNMENT COLLEGE AUTONOMOUS
MODEL QUESTION PAPER
I YEAR –SEMISTER-I
MODULE- FUNDAMENTALS OF GENETICS

MARKS: 70

SECTION-A

I.ANSWER THE FOLLOWING QUESTIONS

5X2=10

- 1.Mitochondria
- 2.Cell cycle
- 3.Pleiotropism
- 4.Polytene chromosomes
- 5.Haemophilia

SECTION –B

II.ANSWER ANY FOUR OF THE FOLLOWING QUESTIONS

4X5=20

6. Write in detail about ultrstructure of Prokaryotic cell structure?
7. Explain briefly about Eukaryotic chromosome organization?
8. Factors contributing the Mendel's experiments- Explain?
9. Explain briefly about Epistaticgene interaction?
10. what is Linkage? Explain with examples?
11. Explain cytological proof of crossing over?

SECTION-C

III.ANSWER THE FOLLOWING QUESTIONS

4X10=40

12. a.) Cell as basic units of living organisms-explain?

Or

b.) Explain in detail about cell membrane ?

13. a.) Explain briefly about deviation from Mendel's law?

Or

b.) Describe the stages of Meiosis?

14. a.) Explain briefly about Law of Segregation?

Or

b.) Describe briefly about Lamp Brush chromosomes?

15.a.) Explain Mitotic crossing over in Drosophila?

Or

b.) Describe about recombination frequency and map distance?

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NAGARJUNA GOVERNMENT COLLEGE AUTONOMOUS
MODEL QUESTION PAPER
I YEAR –SEMISTER-II
MODULE-MOLECULAR BIOLOGY- BIO INFOMATICS
MARKS: 70

SECTION-A

I. ANSWER THE FOLLOWING QUESTIONS

5X2=10

1. T2 bacteriophage
2. Watson & Crick
3. Topoisomerase
4. Klenow fragments
5. Binomial Distribution

SECTION –B

II. ANSWER ANY FOUR OF THE FOLLOWING QUESTIONS

4X5=20

6. Explain Hershey- chase Experiment with Radiolabelled T2 bacteriophage?
7. Write different models of DNA Replication?
8. Describe briefly about DNA damage and Repair?
9. Describe about concept of probability distribution ?
10. Explain Storage of biological data in data banks?
11. Write briefly application of t-test statistics to biological problems/data?

SECTION-C

III. ANSWER THE FOLLOWING QUESTIONS

4X10=40

12. a.) DNA as Genetic Material- Explain
Or
b.) Write the various forms of DNA Models.
13. a.) What is DNA replication? Explain
Or
b.) Rolling circle of replication Explain
14. a.) What is Probability? Explain with Mendel's laws
Or
b.) Explain the Concept of Sampling?
15. a.) What is Bioinformatics? Explain?
Or
b.) Explain the Biological Data bases?

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**NAGARJUNA GOVERNMENT COLLEGE, NALGONDA
(AUTONOMOUS)**

**B.Sc –Biotechnology
MODULE-BIOLOGICAL CHEMISTRY**

**60 hrs
(4 hrs/ week)**

PAPER- III

UNIT-I CARBOHYDRATES

1. Carbohydrates: Importance, classification
2. Structure and configuration of Monosaccharides, monosaccharides: structure, classification and properties
3. Disaccharides- structures of sucrose, lactose, maltose and trehalose glycosidic linkage and sugars as reducing agents.
4. Polysaccharides- storage polysaccharides – starch and glycogen; structural polysaccharides- cellulose and chitin

UNIT-II-CARBOHYDRATES-METOBOLISMS

1. Glycolysis
2. Citric acid cycle
3. Gluconeogenesis and its significance
4. Mitochondrial electron transport, chemiosmotic theory of ATP synthesis
5. Photosynthesis- Light and dark reaction

UNIT- III- PROTEINS & AMINO ACID-METOBOLISM


1. Proteins: classification and structural features of amino acids
2. Stereo isomerism and Zwitter ion properties alloforms of amino acids
3. Peptide bond characteristics, structure and classification
different levels of structures of proteins-primary, secondary, tertiary and quaternary
4. Deamination, decarboxylation and transamination reactions of amino acids.
5. Inborn errors in amino acid metabolism – phenyl alanine and tyrosine (phenylketonuria and albinism)
6. urea cycle


UNIT-IV LIPID- METOBOLISM


1. Lipids: Fatty acids: Saturated and unsaturated
2. Classification of lipids- Saponifiable and non-saponifiable Triglycerols, Phosphoglycerols, Spingolipids, Sterols, Lipid bilayer membranes
3. β -Oxidation of fatty acid- Knoop's theory


Practicals

1. Qualitative tests of sugars.
2. Qualitative tests of amino acids.
3. Qualitative tests of lipids.
4. Quantitative estimations of protein by Biuret Methods
5. Estimation of total sugars by Amino acids


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NAGARJUNA GOVERNMENT COLLEGE, NALGONDA
(AUTONOMOUS)
B.Sc –Biotechnology
MODULE-ENZYMOLGY-BIOPHYSICAL TECHNIQUES

60 hrs

(4 hrs/ week)

PAPER- IV

UNIT-I-ENZYMOLGY

1. Enzymes: Classification of enzymes
2. Kinetics of enzyme catalyzed reactions
3. Factors influencing enzymatic reactions
 - a) PH b) Temperature c) Substrate concentration d) Enzyme concentration
4. Enzyme inhibition- competitive and non competitive

UNIT-II-BIO PHYSICAL TECHNIQUES

1. Colorimetry and Spectrophotometry-Beer-Lambert's Law
2. Microscopy-Light, Inverted, Fluorescent and Electron microscopy
3. Chromatography
 - a) Paper b) Thin Layer c) Ion-exchange d) Gel-filtration
4. Electrophoresis – Paper, Agarose, SDS-PAGE
5. Centrifugation, Dialysis, Cell fractionation, distraction.

UNIT-III-FUNDAMENTALS OF MICROBIOLOGY

- 3.1 Outlines of classification of microorganisms
- 3.2 Structure and general characters of Viruses, Bacteria, Fungi and Micro Algae (one example from each group)
- 3.3 Disease causing pathogens and their symptoms (examples; Typhoid, HIV only)
Isolation, identification and preservation of microorganisms (Bacteria)

UNIT-IV- FUNDAMENTALS OF MICROBIOLOGY

- 3.5 Identification methods of Fungi and useful Micro Algae
- 3.6 Methods of sterilization
- 3.7 Bacterial reproduction and growth kinetics (Batch and continuous Culture). Pure cultures and cultural characteristics

Practicals

1. Paper chromatography of amino acids
2. Separation of compounds by TLC
3. Separation of plant pigments on alumina column/paper chromatography
4. Paper electrophoresis of amino acids
5. Enzyme assays- Catalase (any other enzyme)
6. Preparation of routine microbiological media.
7. Isolation of common non-pathogenic bacteria
8. Staining and identification of bacteria – E.coli, Pseudomonas, Bacillus and Staphylococcus

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NAGARJUNA GOVT. DEGREE COLLEGE, NALGONDA 508001**B.Sc –Biotechnology**
MODULE-MOLECULAR BIOLOGY**PAPER- V****60 hrs**
(3 hrs/ week)**UNIT-I Gene nature and concept**

- 1.1 Organization of nuclear genome – Genes and gene numbers – essential and non essential genes
- 1.2 Denaturation and renaturation of DNA - T_m values and Cot curves
- 1.3 Kinetic classes of DNA - Single copy sequences, and repeated sequences. Inverted, tandem and palindromic repeats
- 1.4 Satellite DNA

UNIT-II Genome organization

- 1.5 Mitochondrial genome organization (eg: Human)
- 1.6 Chloroplast genome organization in plants
- 1.7 Organization of eukaryotic genes - Exons, introns, promoters and terminators
- 1.8 Gene families and clusters – eg. Globin gene, histones and ribosomal genes.

UNIT-III Gene expression & regulation

- 2.1. Prokaryotic and Eukaryotic Transcription
Post-transcriptional modifications (Capping, polyadenylation, splicing and alternate splicing)
- 2.2 Translation Genetic code and its features, Wobble Hypothesis
Synthesis of polypeptides - initiation, elongation and termination in prokaryotes and eukaryotes
- 2.3 Regulation of gene expression in prokaryotes and eukaryotes
Operon concept in bacteria – Lac operon, Tryptophan Operon, Mating types in yeasts

UNIT-IV Cancer Biology

- 2.4 Cancer-Types of Cancer
- 2.5 Characteristics of cancer cells
- 2.6 Oncogenes
- 2.7 Tumour Suppressor Genes

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1. Isolation of DNA from plant/animal/bacterial cells
2. Analysis of DNA by agarose gel electrophoresis
3. Restriction digestion of DNA
4. Estimation of Melting temperature of DNA

Recommended Books

1. Concepts in Biotechnology - By D. Balasubramanian, C.F.A. Bryce, K. Dharmalingam, J. Green and Kunthala Jayaraman
2. Essential Immunology - By I. Roitt, Publ: Blackwell
3. Molecular Biology of the Gene - By Watson, Hopkins, Goberts, Steitz and Weiner
(Pearson Education)
4. Cell and Molecular Biology - By Robertis & Robertis, Publ: Waverly
5. Text Book of Biotechnology - By H.K. Das (Wiley Publications)
6. Gene Structure & Expression - By J.D. Howkins, Publ: Cambridge
7. Test Book of Molecular Biology - By K.S. Sastry, G. Padmanabhan & C. Subramanyan, Publ: Macmillan India
8. Microbial Genetics - By S.R. Maloy, J.E. Cronan & D. Freifelder, Publ: Jones & Barlett
9. Principles of Gene Manipulation - By R.W. Old & S.B. Primrose, Publ: Blackwell
10. Genes - By B. Lewin - Oxford Univ. Press
- Molecular Biology & Biotechnol. - By H.D. Kumar, Publ: Vikas
11. Essentials of Biotechnology - By P.K. Gupta
12. Laboratory Experiments in Microbiology - By M. Gopal Reddy, M.N. Reddy, D.V.R. Sai

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NAGARJUNA GOVT. DEGREE COLLEGE, NALGONDA 508001**MODULE-GENETIC ENGINEERING AND IMMUNOLOGY****PAPER-VII**

60 hrs

(3 hrs/ week)

UNIT- I Recombinant DNA Technology

- 3.1 Enzymes used in gene cloning : Restriction endonucleases, Ligases, Phosphatases, Methylases, Kinases
- 3.2 Cloning vehicles – Plasmids, Cosmids, Phage vectors, Shuttle vectors,
- 3.3 Baculovirus vector system, Expression vectors - expression cassettes
- 3.4 Construction of genomic and cDNA libraries

UNIT- II Applications in rDNA Technology

- 3.5 Identification of cloned genes
- 3.6 Application in genetic engineering –HUMILLIN, SOMTOSTATIN, GOLDEN RICE with Vitamin A
- 3.7 Recombinant vaccines productions

UNIT- III Basics of Immunology

- 2.1 Introduction to immune system – Organs and cells of the immune system
- 2.2 Antigens, Haptens – physico-chemical characteristics
- 2.3 Structure of different immunoglobulins and their functions – Primary and secondary antibody responses, Antigen - Antibody Reaction
- 2.4 The Major Histocompatibility gene complex and its role in organ transplantation, Generation of antibody diversity
- 2.5 Hypersensitivity – Coombs classification, Types of hypersensitivity, Autoimmune diseases – mechanisms of auto immunity

UNIT- IV Virology

- 1. Structure and composition of viruses.
- 2. One-step growth and determination of plaque forming units (PFU).
- 3. Isolation and cultivation of bacterial plaques. Lytic and lysogenic life cycle of λ -phage.
- 4. TMV, Retro viruses- HIV.
Prions and Mycoplasma

Practicals

1. Immuno-diffusion test
2. ELISA Test
3. Microagglutination using microtiter plates (eg. ABO and Rh Blood grouping)
4. Viability tests of cells/bacteria (Evans blue test or Trypan blue test)
5. Coomb's test
6. Multiple sequence alignment

Recommended Books

1. Genetic Engineering - By R. Williamson, Publ: Academic Press
2. Test Book of Molecular Biology - By K.S. Sastry, G. Padmanabhan & C. Subramanyan, Publ: Macmillan India
3. Microbial Genetics - By S.R. Maloy, J.E. Cronan & D. Freifelder, Publ: Jones & Barlett
4. Principles of Gene Manipulation - By R.W. Old & S.B. Primrose, Publ: Blackwell
5. Genes - By B. Lewin - Oxford Univ. Press
6. Molecular Biology & Biotechnol. - By H.D. Kumar, Publ: Vikas
7. Immunology - By G. Reeve & I. Todd, Publ: Blackwell
8. From Genes to Clones - By E.L. Winnacker, Publ: Panima, New Delhi
9. Methods for General & Molecular Bacteriology - By P. Gerhardt et al., Publ: ASM
10. Molecular Biotechnology - By G.R. Click and J.J. Pasternak, Publ: Panima
11. Recombinant DNA - By J.D. Watson et al., Publ: Scikentific American Books
12. Immuno diagnostics - By S.C. Rastogi, Publ: New Age
13. Molecular Biology - By D. Freifelder, Publ: Narosa
14. Genes and Genomes - By Maxine Singer and Paul Berg
15. Cell and Molecular Biology - By S.C. Rastogi
16. Genetic Engineering and Biotechnology - By V. Kumar Gera
17. Essentials of Biotechnology - By P.K. Gupta
18. Immunology - By Kubey
19. Gene Biotechnology - By Jogdand
20. Genome - T.A. Brown
21. Gene Cloning - T.A. Brown

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NAGARJUNA GOVT. DEGREE COLLEGE, NALGONDA 508001**B.Sc –Biotechnology****MODULE-ANIMAL AND PLANT BIOTECHNOLOGY****PAPER - VI****UNIT-I Animal Tissue culture**

- 1.1 Introduction to animal biotechnology
- 1.2 Principles of animal cell culture – culture vessels
- 1.3 Cell culture media preparation, sterilization, types of cultures
- 1.4 Establishment and preservation of cell lines
- 1.5 Explants and cell disaggregation
- 1.6 Culture of cells and tissues (including Stem cells and their application)

UNIT- II Animal Biotechnology Techniques

- 1.7 *In vitro* fertilization and embryo transfer technology
- 1.8 Methods of gene transfer – Microinjection and viral mediated gene transfer techniques
Production of transgenic animals and molecular pharming
- 1.9 Principles of *Ex vivo* and *In vivo* gene therapy

UNIT- III Plant Tissue culture

- 2.1. Composition of media (Murashige and Skoog's and Gamborg's only)
Preparation of media and methods of sterilizations
- 2.2. Role of plant growth regulators in differentiation
- 2.3. Induction of callus
- 2.4. Meristem culture and production of virus free plants
Clonal propagation of plants on a commercial scale (Somatic embryogenesis and organogenesis)

UNIT- IV Plant Biotechnology and Applications


- 2.5. Mass cultivation of cell cultures and process engineering – batch and continuous cultures, Bioreactors
- 2.6. Production of commercially useful compounds by plant cell culture (Shikonin, alkaloids ,food additives)
- 2.6 Biotransformation by plant cell cultures (Digitoxin, Beeta methyl digitoxin)
- 2.7. Methods of gene transfer techniques (*Agrobacterium*, Microprojectile bombardment)
- 2.8. Applications of recombinant DNA technology in agriculture
- 2.9. Production of therapeutic proteins from transgenic plants


Practicals

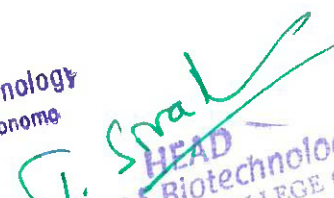
1. Preparation of media, and initiation of callus from any one selected plant species
2. Micropropagation of plants (any one)
3. Preparation of synthetic seeds
4. Preparation of media and culture of animal cells/tissues
5. Cell disaggregation and cell counting


Recommended Books

1. Strategies in Transgenic Animal Sciences - By Glenn M.M. and James M. Robl
ASM Press 2000.
2. Practical Biotechnology – Methods and Protocols - By S. Janarthanan and S. Vincent
(Universities Press)
3. Animal Cells as Bioreactors - By Terence Gatoright, Cambridge Univ Press
4. Molecular Biotechnology - By Chinnarayappa (Universities Press)
5. Principles and Practice of Animal Tissue Culture - By Sudha Gangal
(Universities Press)
6. Introduction to Veterinary Genetics - By F.W. Nicholas, Oxford University Press.
7. Text Book of Biotechnology - By H.K. Das (Wiley Publications)
8. Biotechnology -By H.J. Rehm and G. Reed Vol-1-86 VIH Publications,
Germany
9. Guide for the care and use of lab animals National Academy Press.
10. Biogas Technology - By b.T. Nijaguna
11. Biotechnology – I - By R.S. Setty and G.R. Veena
12. Biotechnology – II - By R.S. Setty and V. Sreekrishna
13. Introduction to Plant Tissue Culture - By M.K. Razdan (Oxford and IBH
Publishing Company, New Delhi)
14. Introduction to Plant Biotechnology - By H.S. Chawla (Oxford and IBH
Publishing Comp., New Delhi)
- Biotechnology - By K. Trehan
15. Introduction to Biotechnology - By P.K. Gupta
16. Frontiers of Plant Tissue Culture - By T.A. Thorpe
17. Plant Tissue Culture – Theory and Practice - By S.S. Bhojwani and M.K. Razdan
18. Biotechnology -- By U. Satyanarayana


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NAGARJUNA GOVT. DEGREE COLLEGE, NALGONDA 508001**B.Sc –Biotechnology
MODULE-INDUSTRIAL AND ENVIRONMENTAL
BIOTECHNOLOGY****PAPER-VIII****60 hrs
(3 hrs/ week)****UNIT- I Industrial Biotechnology I**

- 3.1 Introduction to industrial biotechnology.
- 3.2 Primary and secondary metabolic products of microorganisms
- 3.3 Screening and isolation and preservation of industrial microorganisms
- 3.4 Principles of Fermentation technology
- 3.5 Commercial production of fuels and chemicals by microbial fermentations

UNIT- II Industrial Biotechnology II

- 3.6 Fermentative production of microbial enzymes (amylases, proteases), and antibiotics
- 3.7 Fermentative production of foods and dairy products
- 3.8 Animal cells as bioreactors; characteristics of bioreactors, expression and over production of targeted proteins – human growth hormones – production of α and β - interferons, monoclonal antibodies
- 3.9 Good manufacturing practices, Biosafety issues, Bioethics
- 3.10 Intellectual Property Rights and Patenting issues

UNIT- III Environmental Biotechnology I

- 4.1 Introduction to environmental biotechnology
- 4.2 Renewable and non-renewable energy resources
- 4.3 Conventional energy sources and their impact on environmental
- 4.4 Non-conventional fuels and their impact on environment (biogas, bioethanol, microbial hydrogen production)
- 4.5 Microbiological quality of milk, food and water

UNIT- IV Environmental Biotechnology II

- 4.6 Microbiological treatment of municipal and industrial effluents
- 4.7 Microbial degradation of pesticides and toxic chemicals
- 4.8 Biopesticides and Biofertilizers (Nitrogen fixing, phosphate solubilizing microorganisms)
- 4.9 Microbial ore leaching
Introduction to Bioremediation
- 4.10 **Molecular Techniques** 1 .Basic P.C.R.-modifications of PCR
2. Blotting Techniques (southern ,northern & western)3. DNA fingerprinting

Practicals


6. Production of wine using common yeast
7. Production of hydrogen or biogas using cow/cattle dung
8. Isolation of microbes from soil or industrial effluents
9. Estimation of BOD in water samples
10. Production of alcohol by fermentation and Estimation of alcohol by colorimetry
11. Production of biofertilizers (*Azolla*)
12. Growth curves of bacteria, Measurement of growth in liquid cultures
13. Quality testing of milk by MBRT

Recommended Books

- | | |
|--------------------------------------|--------------------------------------|
| 19. Biotechnology | - By K. Trehan |
| 20. Industrial Microbiology | - By L.E. Casida |
| 21. Food Microbiology | - By M.R. Adams and M.O. Moss |
| 22. Introduction to Biotechnology | - By P.K. Gupta |
| Bioprocess Engineering
Education) | - By Shuler (Pearson |
| 23. Biotechnology – I | - By R.S. Setty and G.R. Veena |
| 24. Biotechnology – II | - By R.S. Setty and V. Sreekrishna |
| 22. Bioethics – Readings and Cases | - By B.A. Brody and H. T. Engelhardt |


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**NAGARJUNA GOVERNMENT COLLEGE
AUTONOMOUS
MODEL QUESTION PAPER
II YEAR –SEMISTER-III**

TIME 2.30 hrs

MARKS: 40

ANSWER ALL QUESTIONS

I

- a. Write detail structure and configuration of monosaccharides. (4 X 8=32)
Or
b. Write the structures of Polysaccharides and their Importance.

II

- a. What is Glycolysis? Explain its significance
Or
b. Mitochondrial electron concept- Explain

III

- a. Write the classifications of amino acids
Or
b. Urea cycle-Explain?

IV

- a. Write the detail classifications of Lipids
Or
b. Write the Knoop's Theory

ANSWER ANY FOUR

(4X2=8)

1. Lactose
2. Glycosidic Linkages
3. Gluconeogenesis
4. Zwitter Ion
5. Decarboxylation
6. Lipid bi layer Membrane
7. Chitin
8. Polysaccharides

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**NAGARJUNA GOVERNMENT COLLEGE
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II YEAR –SEMISTER-IV PAPER-IV**

TIME 2.30 hrs

MARKS: 40

ANSWER ALL QUESTIONS

I

a. Explain details of Enzymes classifications.

(4 X 8=32)

Or

b. Write the factors influencing enzymatic reactions.

II

a. What is Beer- Lambert's law – Explain.

Or

b. Write the principle and procedure of electrophoresis with example.

III

a. Write the structure and characters of different Microorganisms

Or

b. Disease causing pathogens and their symptoms-Typhoid

IV

a. Write the different methods of Sterilizations.

Or

b. Write the Bacterial growth-Explain

ANSWER ANY FOUR

(4X2=8)

1. Competitive inhibition
2. Invert microscope
3. TEM
4. SDS-PAGE
5. Micro algae
6. Hot air Oven
7. Dialysis
8. Electron microscope

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**NAGARJUNA GOVERNMENT COLLEGE
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MODEL QUESTION PAPER
III YEAR –SEMISTER-V PAPER-V**

TIME 2.30 hrs

MARKS: 40

ANSWER ALL QUESTIONS

I

- a. Write the re-association kinetics of DNA detail. (4 X8=32)
Or
b. Write about kinetic classes of DNA.

II

- a. Mitochondrial genome organization in human.
Or
b. Explain in detail Globulin gene clutures

III

- a. Write an account on post-transcriptional modifications.
Or
b. Give an account on Operon concept of Lac gene.

IV

- a. Write the characteristics of Cancer cells
Or
b. Give an account on Tumor suppressor genes

ANSWER ANY FOUR

(4 X2=8)

- 1.C-value paradox
- 2.Tm-curve
- 3.Palindromic repeats
- 4.TATA box
- 5.Promoters
- 6.Exons
- 7.Oncogenes
- 8.Satellite DNA

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**NAGARJUNA GOVERNMENT COLLEGE
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III YEAR –SEMISTER-V PAPER-VI**

TIME 2.30 hrs

MARKS: 40

ANSWER ALL QUESTIONS

(4X8=32)

I

- a. Write a brief account on preparation of animal cell culture media.
Or
b. Give an account of stem cells and their applications.

II

- a. Write a brief account on In vitro fertilizations.
Or
b. Explain about gene therapy with principles

III

- a. Write the role of micronutrients and hormones in morphogenesis.
Or
b. Production of viral free plants in commercial scale.

IV

- a. Write an account on Biotransformation by plant cell cultures.
Or
b. Write an account on vector mediated gene transfer in plants.

ANSWER ANY FOUR

(4X2=8)

1. Inbreeding
2. Super ovulation
3. Auxins
4. Shikonins
5. Bioreactor
6. Ti plasmid
7. Liposome
8. Transgenic animals

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**NAGARJUNA GOVERNMENT COLLEGE
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MODEL QUESTION PAPER
III YEAR –SEMISTER-VI PAPER-VII**

TIME 2.30 hrs

MARKS: 40

ANSWER ALL QUESTIONS

(4 X8=32)

I

- a. Write the role of restriction endonuclease enzyme in gene cloning.
Or
b. Write the brief account on construction of rDNA.

II

- a. What are gene libraries? Explain with significance of Genomic DNA.
Or
b. Production of somatostatin and write the applications in Genetic engineering

III

- a. Write the physico-chemical properties of Antigens
Or

- a. What is Hypersensitivity- Explain

IV

- a. Isolation and cultivation of plaques-Explain
Or
b. Give the account on Retro virus

ANSWER ANY FOUR

(4X2=8)

1. Methylase
2. PBR322
3. Marker genes
4. Golden rice
5. Thymus
6. MHC
7. TMV
8. Mycoplasma

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**NAGARJUNA GOVERNMENT COLLEGE
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III YEAR-SEMISTER-VI PAPER- VIII**

TIME 2.30 hrs

MARKS: 40

ANSWER ALL QUESTIONS

(4X8=32)

I

- a. Write about Primary and secondary metabolic products of microorganisms.
Or
b. Explain briefly about screening and isolations of industrial microorganisms.

II

- a. Give an account of fermentative productions of foods and diary products
Or
b. Give brief an account on production of interferons and monoclonal antibodies

III

- a. Write about Renewable and Non renewable energy resources.
Or
b. Write about Non-conventional fuels and their impact on environment.

IV

- a. Microbial degradation of pesticides and toxic chemicals .
Or
b. Write the different methods of Blotting techniques

ANSWER ANY FOUR

(4X2=8)

1. Amylase
2. Biofertilizers
3. Solar energy converters
4. Chemical sterilizers
5. Biogas
6. Taq-polymerase
7. Ethydiam bromide
8. Bioethics

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