

NAGARJUNA GOVERNMENT DEGREE (A) COLLEGE
NALGONDA.

DEPARTMENT OF BIO TECHNOLOGY

2017 - 18

**NAGARJUNA GOVERNMENT COLLEGE, NALGONDA
(AUTONOMOUS) ALLOCATION OF CREDITS AT SUBJECT LEVEL**

College: N.G.COLLEGE

Course: B.Sc.,

Subject: BIOTECHNOLOGY

| S. No. | Semester | Module(Paper) | Hours | Max. Marks | Credits |
|--------|-----------------------------------|--|-------|-------------|-----------|
| 1 | I(Core) | CELL BIOLOGY AND GENETICS | 04 | 100 | 04 |
| | Practicals- 1 | CELL BIOLOGY AND GENETICS | 06 | 50 | 02 |
| 2 | II (Core) | NUCLEIC ACIDS AND BIOINFORMATICS | 04 | 100 | 04 |
| | practical - 2 | NUCLEIC ACIDS AND BIOINFORMATICS | 06 | 50 50 | 02 |
| 3 | III (Core) | BIOLOGICAL CHEMISTRY | 04 | 100 | 03 |
| 4 | IV (Core) | MICROBIOLOGY AND IMMUNOLGY | 04 | 100 | 03 |
| 5 | Practicals-2 | BIOCHEMISTRY MICROBIOLOGY AND IMMUNOLGY | 03 | 100 | 02 |
| 6 | V Advanced(Core) | MOLECULAR BIOLOGY | 04 | 100 | 03 |
| | Advanced Elective I | GENETIC ENGINEERING & IMMUNOLOG Y | 03 | 100 | 02* |
| | Advanced Elective II | ENVIRONMENTAL BIOTECHNOLOGY | 03 | 100 | 02* |
| 7 | VI Applied(Core) | PLANT AND ANIMAL BIOTECHNOLOGY | 04 | 100 | 03 |
| 8 | Applied Elective I | INDUSTRIAL & ENVIRONMENTAL BIOTECHNOLOGY | 03 | 100 | 02* |
| 9 | Applied Elective II | FOOD SCIENCE AND TECHNOLOGY | 03 | 100 | 02* |
| 10 | Practicals-3 (CORE & ELECTIVE) | MOLECULAR BIOLOGY & Genetic engineering/Environmental Biotechnology | 03 | 50 50 | 02 |
| 11 | Practicals-4 (CORE & ELECTIVE) | PLANT AND ANIMAL BIOTECHNOLOGY, Industrial biotechnology/Food science & Technology | 03 | 50 50 | 02 |
| | TOTAL CREDITS | | | 1400 | 32 |
| | Project Work | On the given topic | | 100 | 03 |



Dr. T. Siva Ram

Asst. Professor

Dept. of Biotechnology

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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 - - 2017 under the chairmanship of the Board of studies and adopted the following Resolutions.

1. Introduction of Choice Based Credit System(CBCS)for I ,II& IIIyear from academic year 2017-2018
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) for I,II &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 end Examination for 70 marks for I ,II& IIIyear for year .
6. To pass and examination are has to get a minimum of 40% 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 the following pattern:
for I ,II& IIIyear 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.
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 20~~17~~17-18.

1. Chairman Board of Studies:

Sri, M.V.V.Satyaveni
In-Charge Dept of Biotechnology
N.G. College, Nalgonda.

2. University Nominee

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

3. Subject expert-from outside college

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

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

4. ~~Members~~

The faculty
Members of the Dept.

1. G.Anjaiah,
Guest Faculty in Biotechnology

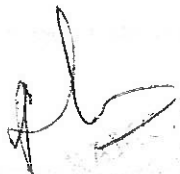
2. Ayesha
Guest Faculty in Biotechnology

DEPARTMENT OF BIOTECHNOLOGY

BOARD OF STUDIES

Board of Studies in the Department of Biotechnology has been constituted with the following members for the year 2017-18.

| S.No | Category | Name and Designation |
|------|--|--|
| 1 | Chairman Board of Studies | Sri M.V.V .Satyaveni, Asst.Prof Incharge Dept. of Biotechnology, N.G. College.Nlg. |
| 2 | University Nominee | 1. Dr.K.Prem Sagar, Asst.Prof, Head Dept of Biotechnology MGU, Nalgonda. |
| 3 | Subject expert- from outside the college | 1.Dr T.Sivaram, Asst.Prof, , MGU, Nlg. 2. Dr.M.Ramchander, Asst. Prof, Dept.of Biochemistry, MGU.Nalgonda. |
| 4 | Members: The Faculty Members of the Dept. | 1.G.Anjaiah, Guest Faculty in Biotechnology. 2.Ayesha, Guest Faculty in Biotechnology. |


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Dept. of Applied Biosciences
University College of Science & Informatics
Vallareddyguda, Nalgonda

NAGARJUNA GOVERNMENT COLLEGE, NALGONDA
(AUTONOMOUS)

B.Sc- I Biotechnology
CELL BIOLOGY AND GENETICS (CBCS)

SEMESTER-I PAPER-I
CORE THEORY-I

60 hrs
(4 hrs/ week)

MODULE-I : Cell structure and Functions

Crain staining

- 1.1. Cell as basic unit of living organisms-bacterial, fungal, plant and animal cells
- 1.2. Ultrastructure of prokaryotic cell (cell membrane and plasmids, Nucleoid)
- 1.3. Ultrastructure of eukaryotic cell (cell wall, cell membrane, nucleus, mitochondria, chloroplast, endoplasmic reticulum, Golgi apparatus, vacuoles)
- 1.4. Fluid mosaic model, Sandwich model, Cell membrane permeability
- 1.5. Structure of chromosome-morphology, components of chromosomes (histones and nonhistones), specialized chromosomes (Polytene, Lampbrush)
- 1.6. Chromosomal aberrations- structural and numerical

MODULE-II: Cell cycle

- 2.1 Bacterial cell division
- 2.2 Eukaryotic cell cycle -phases
- 2.3 Mitosis - Stages (spindle assembly)-significance
- 2.4 Meiosis- Stages (synaptonemal complex)-significance
- 2.5 Senescence and necrosis
- 2.6 Apoptosis

MODULE-III : Principles and mechanism of inheritance

- 3.1 Mendel's experiments- factors contributing to success of Mendel's experiments
- 3.2 Law of segregation- Monohybrid Ratio; Law of independent assortment- dihybrids, trihybrids
- 3.3 Deviation from Mendel's laws- partial or incomplete dominance (eg: Flower Color in *Mirabilis jalapa*), Co-dominance (eg: MN Blood groups), Non allelic interactions-types of epistasis, modification of dihybrid ratios
- 3.4 Penetrance and Expressivity (eg: polydactyly, waardenburg syndrome), pleiotropism, phenocopy- microcephaly, cleft lip
- 3.5 Multiple allelism (eg: Coat color in Rabbits, eye color in *Drosophila* and ABO Blood groups)
- 3.6 X-Y chromosomes - Sex determination in *Drosophila*, Birds, Man, *Bonellia*, X-linked inheritance - Hemophilia, Color blindness, X-inactivation, Y-linked inheritance- Holandric genes

MODULE-IV: Linkage, Recombination and Extension to Mendel's Laws

- 4.1 Linkage and recombination- Cytological proof of crossing over, phases of linkage, recombination frequency, gene mapping and map distance
- 4.2 Non-Mendelian Inheritance - Maternal effect (Shell coiling in snail), variegation in leaves of *Mirabilis jalapa*
- 4.3 Cytoplasmic male sterility in Maize and *Paramecium*,
- 4.4 Mitochondrial inheritance in human and poky in *Neurospora crassa*
- 4.5 Chloroplast inheritance in *Chlamydomonas*
- 4.6 Hardy-Weinberg Equilibrium, allelic and genotypic distribution

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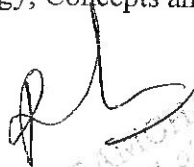
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V. O. Chidambaram University, Tirunelveli - 627 002

CORE-I: PRACTICALS


1. Microscopic observation of cells: bacteria, fungi, plant and animal
2. Preparation of different stages of Mitosis (onion root tips)
3. Preparation of different stages of Meiosis (grasshopper testis)
4. Preparation of Polytene chromosome from *Drosophila* salivary gland ✓
5. Identification, maintenance and culturing of *Drosophila* stock
6. Monohybrid and dihybrid ratio in *Drosophila*
7. Monohybrid and dihybrid ratio in Maize
8. Problems on co-dominance, epistasis, two point and three point test cross, gene mapping, Tetrad analysis
9. Statistical applications of t-test
10. Statistical applications chi square test
11. Statistical applications of Hardy-Weinberg Equilibrium

REFERENCE BOOKS

1. Cell & Molecular Biology. E.D.D De Robertis & E.M.F De Robertis, Waverly publication
2. An introduction to Genetic Analysis by Anthony, J.F. J.A. Miller, D.T. Suzuki, R.C. Richard Lewontin, W.M-Gilbert, W.H. Freeman publication
3. Principles of Genetics by E.J.Gardner and D.P. Snusted. John Wiley & Sons, New York
4. The science of Genetics, by A.G. Atherly J.R. Girton, J.F. Mcdonald, Saundern College publication
5. Principles of Genetics by R.H. Tamarin McGrawhill
6. Theory & problems in Genetics by Stansfield, Schaum out line series McGrawhill
7. Molecular Cell Biology Lodish, H., Baltimore, D; fesk, A., Zipursky S.L., Matsudaride, P. and Darnel. American Scientific Books. W.H. Freeman, New York
8. The cell: A molecular approach. Geoffrey M Cooper, Robert E Hausman, ASM press
9. Cell and Molecular Biology, Concepts and Experiments – Gerald Karp, John Wiley & Sons, Inc



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NAGARJUNA GOVERNMENT COLLEGE
AUTONOMOUS
B.Sc (CBCS) Biotechnology- I year
SEMESTER-I PAPER-I

Max. Marks: 70

CELL BIOLOGY AND GENETICS
SECTION-A

I. ANSWER THE FOLLOWING QUESTIONS

5x2 =10M

- 1.Mitochondria
- 2.Downs syndrome
3. X- inactivation
- 4.Apoptosome
- 5.Haemophilia

SECTION-B

II. ANSWER ANY FOUR OF THE FOLLOWING QUESTIONS

4X5=20M


- 6.Explain cell membrane models: Fluidmosaic, Sandwich, unit membrane model?
- 7.write about the Cell Cycle and its control?
- 8 .Explain about chromosomal structural and numerical aberrations?
- 9.what is Linkage? Explain phases of Linkage with examples?
10. Explain about Hardyweinberg equilibrium, allelic, genotype distribution ?
11. Explain about: X-linked inheritance?


SECTION- C

III. ANSWER THE FOLLOWING QUESTIONS

4 X 10 = 40M

12. a). Write in detail about ultrastructure of Prokaryotic cell?
OR
b.) Explain briefly about Eukaryotic chromosome organization?
- 13 a.) Add a note on meiosis and its significance?
OR
b.) Explain the events involved in apoptosis (cell death)?
14. a). Write briefly about Multiple allelism with examples ?
OR
b.) Explain about Sex determination in Humans, Birds, Drosophila, Bonellia?
15. a.) Explain Non mendelian inheritance –maternal effect Shell Coiling in Snail?
OR
b.). Add a note on Mitochondrial inheritance –in Human & poky in Neurospora crassa?


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II

NAGARJUNA GOVERNMENT COLLEGE, NALGONDA
(AUTONOMOUS) B.Sc- I Biotechnology
NUCLEIC ACIDS & BIOINFORMATICS(CBCS)

SEMESTER-I

CORE THEORY II

MODULE-I : Nucleic Acids and Genome organization

60 hrs

- 1.1 DNA as the genetic material- Griffiths experiments on transformation in *St pneumoniae*, Hershey-Chase experiments with radio labeled T2 bacteriophage, Avery, MacLeod and McCarty's experiments (4 hrs/ week)
- 1.2 RNA as genetic material- Tobacco Mosaic Virus
- 1.3 Structure and forms of DNA (A, B and Z)
- 1.4 Genome organization in prokaryotes
- 1.5 Genome organization in eukaryotes, C-value and C-value paradox, Reassociation kinetics-cot curve, Denaturation, Renaturation, T_m curve
- 1.6 Kinetic classes of DNA- unique sequences, moderately repeated and highly repeated sequences; tandem repeats (satellite, minisatellite and micro satellites), interspersed repeats (SINES-eg: Alu repeats, LINES); palindromic sequences and transposable genetic elements

MODULE-II: DNA Replication, Recombination and Repair

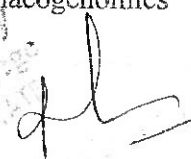
- 2.1 DNA replication- enzymes involved, semi conservative DNA replication-Messelson and Stahl experiment, Linear, Circular, Rolling circle, Theta, D loop
- 2.2 Mutation- spontaneous, induced (frame shift, transition, transversion)
- 2.3 Physical and chemical mutagens
- 2.4 DNA damage- intrinsic and extrinsic factors
- 2.5 DNA repair-Direct, Excision and methyl mediated mismatch, recombinational and SOS repair
- 2.6 DNA recombination-homologous, site specific recombination and NHEJ (Non-Homologous End Joining)

MODULE-III: Concepts of Bioinformatics

- 3.1 Bioinformatics – a historical perspective
- 3.2 Internet and its role in bioinformatics
- 3.3 Bioinformatics Data: Genomes, nucleic acids, proteins, protein structures
- 3.4 Storage of databases in DNA (GenBank, EMBL, DDBJ)
- 3.5 Protein data banks (PDB, SWISS-PROT, UNIPROT, PIR) and their utilization
- 3.6 Data retrieval tools-BLAST, ENTREZ

MODULE-IV: Applications of Bioinformatics

- 4.1 Genome annotation: Gene identification tools
- 4.2 Basics of sequence alignment, Pairwise alignment (global and local)
- 4.3 Multiple sequence alignment and phylogenetic analysis
- 4.4 Structural classification of proteins and homology model building
- 4.5 Applications of Bioinformatics- drug targets, overview of drug designing
- 4.6 Concepts of Pharmacogenomics


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MG University, Nalgonda

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CORE-II: PRACTICALS

1. Isolation of DNA from Plant cells
2. Isolation of DNA from Animal cells
3. Estimation of DNA by Diphenylamine method
4. Estimation of RNA by Orcinol method
5. Exploring data bases: Genbank and Uniprot
6. Exploring the structural data bases: PDB, MMDB
7. Visualization of Protein structures-RASMOL
8. Database searching and downloading bioinformatics data- DNA (Gen bank, DDBJ, ENA) Protein (Uniprot)
9. Pairwise sequence alignment (global and local) of DNA and proteins
10. Multiple sequence alignment of DNA & protein sequences using ClustalW
11. Database searching with heuristic algorithms: BLAST

REFERENCE BOOKS

1. Genes VII. Benjamin Lewin, Oxford Univ. Press, Oxford
2. Molecular Biology by D. Freifelder Narosa Publishing house New York, Delhi
3. Molecular Cell Biology Lodish, H., Baltimore, D; fesk, A., Zipursky S.L., Matsudaride, P. and Darnel. American Scientific Books. W.H. Freeman, NewYork
4. Molecular Biology by Brown
5. Essentials of Molecular Biology. D. Freifelder, Panima Publishing Corporation.
6. Bioinformatics: Sequence and Genome Analysis by David W. Mount, Cold Spring Harbor Laboratory Press
7. Biological Sequence Analysis: Probabilistic Models of Proteins and Nucleic Acids by Richard Durbin, Sean R. Eddy, Anders Krogh, Graeme Mitchison, Cambridge University Press
8. Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, Andreas D. Baxevanis, B. F. Francis Ouellette, Wiley-Interscience
9. Bioinformatics tools and Resources – free online tools, downloadable free tools, software packages, internet, Bioinformatics books and Journals, Bioinformatics web-portals

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NAGARJUNA GOVERNMENT COLLEGE, NALGONDA
NUCLEIC ACIDS AND BIOINFORMATICS(CBCS)

SEMISTER-II PAPER-II

SECTION-A

MARKS:70

1. ANSWER THE FOLLOWING QUESTIONS

5 X 2 = 10M

- 1.C-value
- 2.B- DNA
- 3.BLAST
- 4.Photoreactivation
5. LINES

SECTION-B

II.ANSWER ANY FOUR OF THE FOLLOWING QUESTIONS

4X5=20M

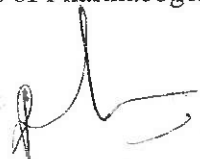
- 6.Explain kinetic classes of DNA?
- 7.Write about -homologous, site specific DNA recombination ?
- 8.Explain the storage of Databases in DNA databanks ?
- 9.Add a note on Multiple sequence alignment ?
- 10.Explain structural classification of proteins ?
11. write different Structures and forms of DNA?

SECTION -C

III.ANSWER THE FOLLOWING QUESTIONS

4 X 10 = 40 M

- 12a).Explain briefly Semiconservative DNA replication Messelson and stahl experiment? Or
- b.)Write briefly about the Experiment with Radiolabelled T2 bacteriophage?
- 13.a.)Write about the enzymes involved in DNA replication?
Or
- b.)Describe briefly about DNA Damage with its types?
- 14.a.)Write briefly about protein databases& their utilization in databanks?
Or
- b.)Explain briefly about Phylogenetic analysis and its importance?
- 15.a.)Write about the drug designing and its targets?
Or
- b.)Add a note on concepts of Pharmacogenomics?



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10

University of Nalgonda
Department of Biotechnology
Nalgonda

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

B.Sc-II Biotechnology

BIOLOGICAL CHEMISTRY(CBCS)

SEMESTER-III

PAPER-III

**60hr
4hr/week**

Unit 1: Biomolecules-Carbohydrates and Lipids

- 1.1 Carbohydrates-Importance, classification, physical and chemical properties of carbohydrates
- 1.2 Structure, configuration and biochemical importance of monosaccharides (Glucose and Fructose)
Oxidation, Reduction; Vitamins- classification, sources, functions and applications
- 1.3 Reducing and non-reducing sugars- structure, configuration and biochemical importance of disaccharides and glycosidic bond (Sucrose, Lactose, Maltose, Isomaltose)
- 1.4 Structure and functions of polysaccharides (Starch, glycogen, chitin)
- 1.5 Lipids, Fatty acids- importance, properties and classification, simple lipids- tag, complex lipids, derived lipids, sterols, fatty acids: saturated and unsaturated fatty acids with examples
- 1.6 Acids, Bases, acid-base interactions, pH, buffers, functional groups

Unit 2: Biomolecules-Proteins

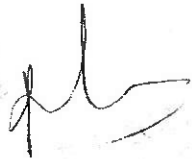
- 2.1 Classification, structure, physical and chemical properties of amino acids
- 2.2 Characteristic properties of peptide bond and formation
- 2.3 Structure of proteins, primary, secondary, tertiary and quaternary
- 2.4 Enzymes-classification and nomenclature
- 2.5 Michaelis Menton equation-factors influencing the enzyme reactions and enzyme inhibition (competitive and non-competitive), role of co-enzymes.
- 2.6 Peptide-hormones, mode of action, thyroid gland, pancreatic hormones

Unit 3: Metabolism and Cell Signaling

- 3.1 Basic concepts of metabolism, anabolic and catabolic pathways with examples.
- 3.2 Glycolysis, TCA Cycle, electron transport, Oxidative phosphorylation
- 3.3 Gluconeogenesis and its significance
- 3.4 β -oxidation of fatty acid, transamination and oxidative deamination reactions of amino acids
- 3.5 Basic characteristics of cell signaling- paracrine, endocrine, autocrine
- 3.6 Second messengers and their role in signal transduction

Unit 4: Bioanalytical techniques

- 4.1 Colorimetry: Beer and Lambert's laws and UV- Vis spectrophotometry
- 4.2 Principle and applications of Chromatography (Paper, thin layer, ion exchange and gel filtration, HPLC)
- 4.3 Principle and applications of Electrophoresis (Native gels and SDS-PAGE, Agarose)
- 4.4 Principle and applications of centrifugation (Preparative and Analytical)
- 4.5 Principle and applications of X-ray crystallography
- 4.6 Principle and applications of NMR



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Practicals

CORE-III: PRACTICALS

1. Preparation of normal, molar and molal solutions ✓
2. Preparation of buffers (acidic, basic and neutral) ✓
3. Qualitative tests of sugars, amino acids and lipids ✓
4. Estimation of total sugars by Anthron method ✓
5. Reducing sugars by DNS method ✓
6. Separation of amino acids by paper chromatography, TLC ✓
7. Estimation of proteins by Biuret method ✓
8. Enzyme assay- catalase or invertase ✓
9. Determination of acid value of fats ✓
10. Amylase activity assay ✓

REFERENCE BOOKS

1. Lehninger Principles of Biochemistry By: David L. Nelson and Cox
2. Biochemistry By: Rex Montgomery
3. Harper's Biochemistry By: Robert K. Murray
4. Enzymes By: Trevor Palmer
5. Enzyme structure and mechanism By: Alan Fersht
6. Principles of Biochemistry By: Donald J. Voet, Judith G. Voet, Charlotte W. Pratt
7. Analytical Biochemistry By Cooper
8. Principles and techniques of Biochemistry and Molecular Biology Edited By Keith Wilson and John Walker
9. Experimental Biochemistry: A Student Companion by Sashidhar Beedu et al
10. Practical Biochemistry By Plummer

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NAGARJUNA GOVERNMENT COLLEGE AUTONOMOUS
MODEL QUESTION PAPER

BIOLOGICAL CHEMISTRY II YEAR

SEMESTER-III

PAPER-III

MARKS: 70

SECTION-A

I. ANSWER THE FOLLOWING QUESTIONS

5X2=10

1. Mutarotation?
2. Chemiosmotic theory?
3. Zwitter ion?
4. Spingolipids?
5. Deamination?

SECTION-B

II. ANSWER ANY FOUR OF THE FOLLOWING QUESTIONS

4X5=20

6. Write detailed structure of Disaccharides ?
7. Explain briefly about Gluconeogenesis and its significance.?
8. Explain different levels of structural proteins.?
9. Write about classifications of lipids.?
10. Write about in born errors in amino acids catabolisms.?
11. Write about Z scheme Photosynthesis reaction?

SECTION -C

III. ANSWER THE FOLLOWING QUESTIONS

4X10=40

- 12 a.) Write the Carbohydrate classification and importance?
Or
b.) Write about structure and configuration of monosaccharides and its properties?
13. a.) Describe Electron transport chain in mitochondria?
Or
b.) Explain briefly about factors influencing the Enzyme reactions?
14. a.) Write about basic characteristics of cell signaling? Add a note on Second messengers?
Or
b.) Write about Physico chemical properties of amino acids?
15. a.) Explain briefly about principle and applications of Agarose gel electrophoresis?
Or
b.) Write about Principles and application of X-ray Crystallography?

NAGARJUNA GOVERNMENT COLLEGE, NALGONDA
(AUTONOMOUS)

B.Sc-II Biotechnology
MICROBIOLOGY AND IMMUNOLGY
SEMESTER-IV

60 hrs
(4 hrs/ week)

Unit 1: Fundamentals of Microbiology

- 1.1 Historical development of Microbiology and contributors of microbiology
- 1.2 Microscopy: Bright field microscopy, Dark field microscopy, Phase contrast microscopy, Flourescent microscopy, scanning and Transmission Electron microscopy
- 1.3 Outlines of classification of Microorganisms
- 1.4 Structure and general characteristics of Bacteria
- 1.5 Structure and general characteristics of Virus
- 1.6 Structure and general characteristics of Micro algae and Fungi

Unit 2: Culture and Identification of Microorganisms

- 2.1 Bacterial nutrition, Nutritional types of Bacteria, Essential macronutrients, micronutrients and growth factors
- 2.2 Bacterial growth, factors influencing bacterial growth
- 2.3 Typical growth curve-batch and continuous cultures, synchronous cultures
- 2.4 Measurement of bacterial growth- measurement of cell number and cell mass
- 2.5 Culturing of anaerobic bacteria
- 2.6 Culturing of viruses

Unit 3: Basics of Immunology

- 3.1 Types of immunity-innate and adaptive immunity
- 3.2 Cells of the immune system: T-cells (helper and cytotoxic cells), B-cells, natural killer cells, macrophages, basophils and dendritic cells
- 3.3 Primary organs of immune system (thymus and bone marrow)
- 3.4 Secondary organs of immune system (Spleen and lymph nodes)
- 3.5 Complement system-functions and components of complement system
- 3.6 Cell mediated immunity and cytokines

Unit 4: Antigens and Antibodies

- 4.1 Antigens-Immunogenicity vs Antigenicity, factors affecting antigenicity, epitopes, haptens, adjuvants
- 4.2 Antibody structure, function and diversity, antigen-antibody reactions, complement activation
- 4.3 Antigen antibody interactions, principle and applications of precipitation and agglutination
- 4.4 Monoclonal antibodies, production and applications
- 4.5 Basic concepts of cell mediated immunity, autoimmunity and hypersensitivity
- 4.6 Major Histocompatibility Complex and its role in organ transplantation

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MG University, Yellareddy, Nalgonda

Practicals

CORE-IV: PRACTICALS

1. Sterilization methods ✓
2. Preparation of microbiological media ✓
3. Isolation of bacteria by streak, spread, and pour plate method ✓
4. Isolation of soil bacteria ✓
5. Simple staining and differential staining (Gram's staining) ✓
6. Bacterial growth curve ✓
7. Replica plating ✓
8. Microhaemagglutination (eg. ABO and Rh Blood grouping) ✓
9. Viability tests of cells (Trypan blue test) ✓
10. Differential leukocyte count ✓
11. Single radial Immunodiffusion } RID -
12. ELISA ✓

REFERENCE BOOKS

1. Brock, T.D. and Madigan, M.T. Biology of Microorganisms
2. Prescott, L.M., Harley, J.P. Klein, D.A. Microbiology
3. Pelczar, M.J, Chan, E.C.S., Ereig, N.R. Microbiology
4. Benson Microbiological applications
5. Freifelder, D Physical biochemistry: application to biochemistry and molecular biology
6. Wilson & Walker Practical biochemistry
7. Upadhyay and Upadhyay Physical Biochemistry
8. Essential Immunology - By I. Roitt, Publ: Blackwell
9. Immunology - By G. Reeve & I. Todd, Publ: Blackwell
10. Abbas AK, Lichtman AH, Pillai S. Cellular and Molecular Immunology. Saunders Publication, Philadelphia
11. Goldsby RA, Kindt TJ, Osborne BA. Kuby's Immunology. W.H. Freeman and Company, New York

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ASSISTANT PROFESSOR
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**NAGARJUNA GOVERNMENT COLLEGE AUTONOMOUS
MODEL QUESTION PAPER
MICROBIOLOGY AND IMMUNOLGYII YEAR**

**SEMESTER-IV
PAPER-III**

MARKS: 70

SECTION-A

I.ANSWER THE FOLLOWING QUESTIONS

5X2=10

1. TEM?
2. Archaeobacteria?
3. synchronous culture?
4. Bonemarrow?
5. Autoimmunity

SECTION-B

II.ANSWER ANY FOUR OF THE FOLLOWING QUESTIONS

4X5=20


6. Write briefly about Electron microscopy and its types?
7. write about Bacterial growth curve?
8. Add a note on T-cells and B-cells?
9. Expalin briefly about Types of Immunity?
10. write about Bacteria nutrition and its types?
11. write about Cellmediated immunity?


SECTION -C


III.ANSWER THE FOLLOWING QUESTIONS

4X10=40

- 12 a.)Write about Outlines of classifications of microorganisms?
Or
b.)write about structure and general characteristics of Bacteria?
- 13.a.)Explain about measurements of Bacterial Growth?
Or
b.) Write about culturing of viruses?
- 14.a.)Explain briefly about Cells of immune system?
Or
b.)write about complement system and its components?
- 15.a.)write about MHC Complex and its role in organ transplantation?
Or
b.)Explain briefly about antibodies and its types with functions?


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NAGARJUNA GOVERNMENT COLLEGE AUTONOMOUS
MODEL QUESTION PAPER
NAGARJUNA GOVT. DEGREE COLLEGE, NALGONDA 508001

B.Sc -III-Biotechnology
MOLECULAR BIOLOGY(CBCS)(CORE)
SEMESTER-V

60 hrs
3 hrs/ week)

PAPER- V

MODULE-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

MODULE- II Genome organization

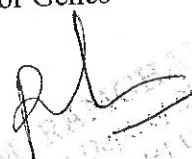
- 1.5 Mitochondrial genome organization (eg: Human)
- 1.6 Chloroplast genome organization in plants
- 1.7 Organization of eukaryotic genes - Exons, introns, promoters and terminators
- 1.8 Gene families and clusters – eg. Globin gene, histones and ribosomal genes.

MODULE-III Gene expression®ulation

- 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

MODULE-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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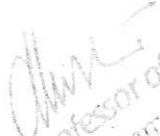
V Practicals


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 GOVERNMENT COLLEGE
AUTONOMOUS
MODEL QUESTION PAPER
III YEAR -SEMESTER-V PAPER-V
(CORE)MOLECULAR BIOLOGY
SECTION-A

I.ANSWER THE FOLLOWING QUESTIONS

MARKS: 70
5X2=10

1. C-value paradox
2. Tm-curve
3. Palindromic repeats
4. TATA box
5. Promoters

SECTION-B

II.ANSWER ANY FOUR OF THE FOLLOWING QUESTIONS

4X5=20


6. Write the re-association kinetics of DNA detail.
7. Write about kinetic classes of DNA.
8. Mitochondrial genome organization in human.
9. Write an account on Post-transcriptional modifications.
10. Give an account on Operon concept of Lac gene.
11. Write the characteristics of Cancer cells

SECTION -C

III.ANSWER THE FOLLOWING QUESTIONS

4X10=40

12. a.) Describe the Nuclear Genome of eukaryotic and Prokaryotic cells?
Or
b.) Write the salient features of satellite DNA ?
13. a.) Write in detail about Chloroplast genome Organisation?
Or
b.) Define gene families and clusters with one example?
14. a.) Describe the Translation process in Eukaryotes?
Or
b.) write in detail about the transcription of Eukaryotes?
Or
15. a.) Define cancer and types of cancers?
Or
b.) Write in detail about oncogenes?


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B.Sc III-Biotechnology_PAPER- VI

GENETIC ENGINEERING&IMMUNOLOGY(CBCS)(Advanced Elective-I)

60 hrs
(3 hrs/ week)

MODULE- 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.
- 3.4 Construction of genomic and cDNA libraries

MODULE- 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

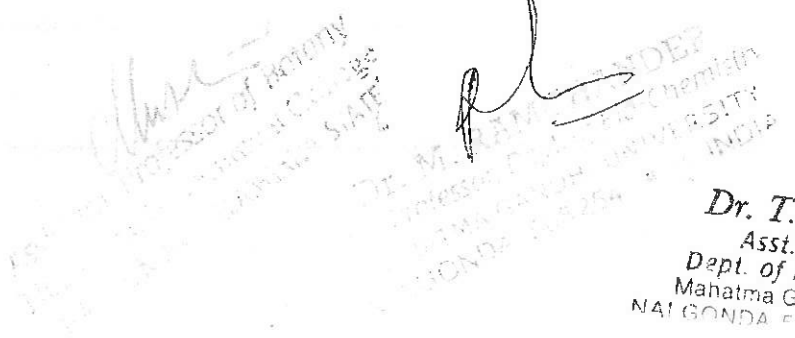
MODULE- III Basics of Immunology

- 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, Generation of antibody diversity
- 2.4 The Major Histocompatibility gene complex and its role in organ transplantation.
- 2.5 Hypersensitivity – Coombs classification, Types of hypersensitivity, Autoimmune diseases – mechanisms of auto immunity

MODULE- 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


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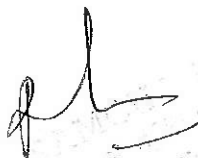

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VI Practicals

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

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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Technology

NAGARJUNA GOVERNMENT COLLEGE(AUTONOMOUS)

GENETIC ENGINEERING&IMMUNOLOGY(CBCS)(Advanced Elective-I)

MODEL QUESTION PAPER -PAPER- VI

III YEAR (ADVANCED ELECTIVE-I)

TIME 2.30 hrs

MARKS: 70

SECTION-A

I.ANSWER THE FOLLOWING QUESTIONS

5X2=10

- 1.Restriction endonucleases
- 2.PBR322
- 3.Southern blotting
- 4.Golden rice
- 5.Thymus

SECTION-B

II.ANSWER ANY FOUR OF THE FOLLOWING QUESTIONS

4X5=20

- 1.Palindromic sequences
- 2.Somatostatin
- 3.Hapten
- 4.MHC Complexes
- 5.Rheumatoid Arthritis
- 6.Prions & Mycoplasma

SECTION -C

III.ANSWER THE FOLLOWING QUESTIONS

4X10=40

- 1 a.)Write the role of restriction endonuclease enzyme in gene cloning?
Or
b.)Write the brief an account on construction of recombinant DNA.?
2. a.) Explain about the Recombinant vaccines and its production?
Or
b.) Applications of rDNA technology in Genetic engineering?
- 3.a.)Write the physico-chemical properties of Antigens?
Or
b.)What is Hypersensitivity-Explain its type with examples ?
- 4.a.)Explain Isolation and cultivation of plaques?
Or
b.)what is Retro virus?Explain HIV replication with neat diagram?

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

B.Sc III-Biotechnology PAPER- VI

(ADVANCED ELECTIVE-II) ENVIRONMENTAL BIOTECHNOLOGY:

**60hr
(3hrs/ week)**

Unit I: Biological Treatment of Wastewater – Aerobic System

Biological processes for domestic and industrial waste water treatments; Aerobic systems - activated sludge process, trickling filters, biological filters, rotating biological contractors (RBC), Fluidized bed reactor (FBR), expanded bed reactor, Inverse fluidized bed biofilm reactor (IFBBR) packed bed reactors air- sparged reactors, Biological Treatment of Wastewater – Anaerobic System

Unit II: Bioremediation

Introduction, constraints and priorities of Bioremediation, Biostimulation of Naturally occurring microbial activities, Bioaugmentation, in situ, ex situ, intrinsic & engineered bioremediation, Solid phase bioremediation - land farming, prepared beds, soil piles, Phytoremediation

Unit III: Metal Biotechnology

Mining and Metal biotechnology – with special reference to Copper & Iron. Microbial transformation, accumulation and concentration of metals, metal leaching, extraction and future prospects.

Bio Fuels

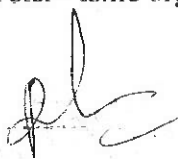
Microorganisms and energy requirements of mankind; Production of nonconventional fuels - Methane (Biogas), Hydrogen, Alcohols and algal hydrocarbons, Use of microorganisms in augmentation of petroleum recovery.

Unit IV: Hazardous Waste Management- I

Introduction - Xenobiotic compounds, recalcitrance, hazardous wastes - biodegradation of Xenobiotics . Biological detoxification - market for hazardous waste management –

Hazardous Waste Management- II

biotechnology application to hazardous waste management - examples of biotechnological applications to hazardous waste management - cyanide detoxification - detoxification of oxalate, urea etc. - toxic organics - phenols.



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Recommended Books

1. Environmental Biotechnology by S. K. Agarwal
2. Biodegradation & Bioremediation (1999), Martin Alexander, Academic press.

REFERENCES:

1. Stanier R. Y., Ingram J.L., Wheelis M.L., Painter R.R., General Microbiology, McMillan Publications, 1989.
2. Foster C.F., John Ware D.A., Environmental Biotechnology, Ellis Horwood Ltd., 1987.
3. Karrelly D., Chakrabarty K., Omen G.S., Biotechnology and Biodegradation, Advances in Applied Biotechnology Series, Vol.4, Gulf Publications Co. London, 1989.
4. Bioremediation engineering; design and application 1995 John. T. cookson, Jr. Mc Graw Hill, Inc.
5. Environmental Biotechnology by A.K. Chatterjee
6. Environmental Biotechnology by S.N.Jogdand Himalaya Publishing

[Faint handwritten signatures and stamps are visible in this area, including one that reads "DR. M. RAMSARAN" and another that reads "MAHATMA GANDHI UNIVERSITY NALGONDA - 508 254 - T.S. INDIA".]

[Handwritten initials "TR" are visible to the left of the signature.]
Dr. T. Siva Ram
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[Faint handwritten signature and stamp are visible in this area, including one that reads "MAHATMA GANDHI UNIVERSITY NALGONDA - 508 254 - T.S. INDIA" and another that reads "M.G. University" and "Nalgonda".]

NAGARJUNA GOVERNMENT COLLEGE(AUTONOMOUS)

MODEL QUESTION PAPER B.Sc III-Biotechnology PAPER- VI III YEAR

(ADVANCED ELECTIVE-II) ENVIRONMENTAL BIOTECHNOLOGY

TIME 2.30 hrs

SECTION-A

MARKS: 70

5X2=10

I.ANSWER THE FOLLOWING QUESTIONS

1. Waste water Treatment.
2. Fluidised bed reactor
3. Palindromic repeats
4. Bioaugmentation
5. Metal leaching

SECTION-B

II.ANSWER ANY FOUR OF THE FOLLOWING QUESTIONS

4X5=20

6. Write in detail about the waste water treatment in aerobic system.
7. Write about Bioremediation.
8. Describe the process of mining and extraction of iron
9. write the petroleum recovery methods.
10. what are biofuels and their importance.
11. write the anerobic system of waste water treatment.

SECTION -C

III.ANSWER THE FOLLOWING QUESTIONS

4X10=40

12.a.)Describe the process of domestic and waste water treatment?

Or

b.)Write the Biological Treatment of Wastewater -- Anaerobic System?

13.a.)Write in detail about constraints and priorities of Bioremediation?

Or

b.)Define Solid phase bioremediation and its procedures?

14.a.)Describe the Mining of copper?

Or

b.)write in detail about Microorganisms and energy requirements of mankind fuels – Methane (Biogas)?

Or

15.a.)Define Biological detoxification and its methods?

b.)Write in detail about detoxification of oxalate, urea?

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B.Sc-III Biotechnology
ANIMAL AND PLANT BIOTECHNOLOGY(CORE)
SEMESTER VI-PAPER-VII

60hr
(3 hrs/ week)

MODULE-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)

MODULE- 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 ✓

MODULE- 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)

MODULE- 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


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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 Gartwright, 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 GOVERNMENT COLLEGE
AUTONOMOUS
MODEL QUESTION PAPER
ANIMAL AND PLANT BIOTECHNOLOGY(CORE)
III YEAR –SEMISTER-VI PAPER-VII**

TIME 2.30 hrs

MARKS: 70

SECTION-A

I.ANSWER THE FOLLOWING QUESTIONS

5X2=10

- 1 .RPMI 1640 MEDIA
2. ICSI Treatment
3. Auxins
4. Ti plasmid
- 5.Somatic embryogenesis

SECTION-B

II.ANSWER ANY FOUR OF THE FOLLOWING QUESTIONS

4X5=20

1. write the method of primary cell culturing ?
2. write about the establishment of animal cell lines?
3. write about the method of viral mediated gene transfer in animals?
4. Explain clonal propagation(Somatic and Organogenesis)?
5. write the Role of PGRS in plant growth?
6. Explain Mass cultivation of bioreactor?

SECTION –C

III.ANSWER THE FOLLOWING QUESTIONS

4X10=40

1a)Write briefly about preparation of animal cell culture media and Sterilization?

Or

b).Give an account on stem cells and their applications.

2a).Write a brief account on In vitro fertilization(IVF).

Or

b)Explain about the Ex vivo and In vivo gene therapy with examples?

3a)Write the Ingredients in MS MEDIA and its sterilization?

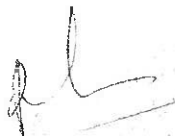
Or

b.)Production of virus free plants in commercial scale.

4a.)write an account on applications of rDNA technology in agriculture?

Or

b.)Write an account on Agrobacterium mediated gene transfer in plants.



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B.Sc- III Biotechnology
INDUSTRIAL AND ENVIRONMENTAL BIOTECHNOLOGY (APPLIED ELECTIVE-I)
III YEAR – SEMISTER-VI PAPER-VIII

60 hrs
(3 hrs/ week)

MODULE- 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

MODULE- II **Industrial Biotechnology II**

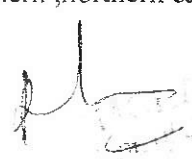
- 3.6 Fermentative production of microbial enzymes (amylases, proteases), and antibiotics
- 3.7 Fermentative production of foods and dairy products
- 3.8 Animal cells as bioreactors; characteristics of bioreactors, expression and over production of targeted proteins – human growth hormones – production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

MODULE- 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

MODULE- 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


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Practicals

1. Production of wine using common yeast
2. Production of hydrogen or biogas using cow/cattle dung
3. Isolation of microbes from soil or industrial effluents
4. Estimation of BOD in water samples
5. Production of alcohol by fermentation and Estimation of alcohol by colorimetry
6. Production of biofertilizers (*Azolla*)
7. Growth curves of bacteria, Measurement of growth in liquid cultures
8. 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 | - By Shuler (Pearson Education) |
| 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
MODEL QUESTION PAPER
INDUSTRIAL BIOTECHNOLOGY (APPLIED ELECTIVE -I)
III YEAR –SEMISTER-VI PAPER-VIII

TIME 2.30 hrs

MARKS: 70

SECTION-A

I. ANSWER THE FOLLOWING QUESTIONS

5X2=10

1. Amylase
2. Biofertilizers
3. Solar energy converters
4. Chemical sterilizers
5. Biogas

SECTION-B

II. ANSWER ANY FOUR OF THE FOLLOWING QUESTIONS

4X5=20

1. Give in detail about the commercial production of ethanol?
2. Write the principles of Fermentation technology?
3. Give the characteristics of Bioreactors?
4. Explain some of the Biosafety methods in laboratories?
5. Factors involved in food quality explain?
6. Write the Principle involved in PCR?

SECTION –C

III. ANSWER THE FOLLOWING QUESTIONS

4X10=40

- 1 a.) Write about Primary and secondary metabolic products of microorganisms.
Or
b.) Explain briefly about screening and isolations of industrial microorganisms.
2. a.) Give an account of fermentative productions of foods and dairy products
Or
b.) Give brief an account on production of interferons and monoclonal antibodies
3. a.) Write about Renewable and Non renewable energy resources.
Or
b.) Write about Non-conventional fuels and their impact on environment.
4. a.) Explain Microbial degradation of pesticides and toxic chemicals .
Or
b.) Write the different methods of Blotting techniques

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NAGARJUNA GOVERNMENT COLLEGE, NALGONDA
(AUTONOMOUS)
FOOD SCIENCE & TECHNOLOGY (APPLIED ELECTIVE-II)
III YEAR – SEMESTER-VI PAPER-VIII
45 hrs(2hrs/ week)

Unit I: Introduction To Food Processing

Biotechnology in relation to the food industry, nutritive value of food, and types of microorganisms associated with food, its sources, types and behavior in foods.

Unit II: Bioprocessing

Bioprocessing of meat, fisheries, vegetables, dairy products, enzymes and chemicals used in food processing, biochemical engineering for flavor and food production, cryopreservation, irradiated foods.

UNIT-III: Dairy products, non-beverage plant products, beverages and related products of baking.

Quality Control

Quality control, case studies on Biotechnology in the evolution of food quality.

Food Spoilage & Food Borne Diseases

UNIT-IV: Food -borne infections & intoxications.

Food Microbiology I

Utilization of microorganisms in food Industry, Single cell protein, Nutraceuticals etc.,

Food Microbiology II

Natural and artificial sweeteners and their role in controlling diseases and deficiencies.

Reference Book :

1. Roger A., Gordan B., and John T., Food Biotechnology, 1989.
2. Frazier, Food Microbiology, REFERENCES

1. George J.B., Basic Food Microbiology, CBS Publishers Distributors, 1987.
2. James M .J. Modern Food Microbiology, CBS Publishers & Distributors, 1987.
3. Lindsay, Willis Biotechnology, Challenges for the flavor and food Industries, Elsevier Applied Science, 1988.

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NAGARJUNA GOVERNMENT COLLEGE
AUTONOMOUS
MODEL QUESTION PAPER
III YEAR – SEMISTER-VI PAPER-VIII
FOOD SCIENCE & TECHNOLOGY (APPLIED ELECTIVE-II)

SECTION-A

TIME 2.30 hrs

MARKS: 70

I. ANSWER THE FOLLOWING QUESTIONS

5X2=10

1. Nutritive value of food
2. cryopreservation
3. Bioprocessing of meat
4. Food Spoilage
5. Neutraceuticals

SECTION-B

II. ANSWER ANY FOUR OF THE FOLLOWING QUESTIONS

4X5=20

6. Write the importance of food processing.
7. Write about dairy products.
8. Give two Food Borne Diseases.
9. Write the evolution of food quality.
10. Give some Single cell protein
11. Write the characteristics Natural and artificial sweeteners

SECTION –C

III. ANSWER THE FOLLOWING QUESTIONS

4X10=40

12. a.) Describe the types of microorganisms associated with food, its sources?
Or
b.) Write the different types of microorganisms involved in food processing ?
13. a.) Write in detail about Dairy products ?
Or
b.) Describe biochemical engineering for flavor and food production?
14. a.) Describe the cryopreservation, irradiated foods.
Or
b.) Write in detail about the Quality Control of foods?
15. a.) Describe Utilization of microorganisms in food Industry?
b.) Write in detail about Food -borne infections & intoxications?

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NAGARJUNA GOVERNMENT COLLEGE(A),NALGONDA
PANEL OF EXAMINERS FOR THE ACADEMIC YEAR2017-18
DEPARTMENT OF BIOTECHNOLOGY

| S.N O | SUBJECT | S. N O | Name Designation, Workingaddress/Mobile No/ Email ID | Residential Address | Remarks |
|----------|--|--------------|---|---------------------------------------|------------|
| 1 | FIRST YEAR (PAPER-I) CELL BIOLOGY AND GENETICS | 1 | Dr.T.Sivaram Asst Prof | Deptof Biotechnology ,MGU,NLG | 9032694559 |
| 2 | | 2 | Dr.K.Premsagar Asst Prof | HOD Dept of Biotech,MGU,NLG | 8500275976 |
| 3 | | 3 | Dr.M.Thirumala Asst Prof | Dept.of Biochemistry, MGU.Nalgonda | 9490705105 |
| 4 | FIRST YEAR (PAPER-II) NUCLEIC ACIDS AND BIOINFORMATIC S | 1 | Dr.K.Premsagar Asst Prof | Deptof Biotechnology ,MGU,NLG | 8500275976 |
| 5 | | 2 | Dr.T.Sivaram Asst Prof | HOD Dept of Biotech,MGU,NLG Dept | 9032694559 |
| 6 | | 3 | Dr.K.VenugopalRao Asst Prof | Dept of Pharma Biotech | 9849170415 |
| 7 | SECOND YEAR (PAPER-III) BIOLOGICAL CHEMISTRY | 1 | Dr.M.RAMCHANDER Asst Prof | Dept of Biochemistry(MGU,NLG) | 9989427725 |
| 8 | | 2 | Dr.M.Thirumala Asst Prof | Dept.of Biochemistry, MGU.Nalgonda | 9490705105 |
| 9 | | 3 | Dr.T.Sivaram Asst Prof | Deptof Biotechnology ,MGU,NLG | 9032694559 |

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| S.NO | SUBJECT | S.NO | Name Designation, Working address/Mobile No/ Email ID | Residential Address | Remarks |
|------|---|------|---|---|-------------------------|
| 10 | SECOND YEAR (PAPER-IV) BIOLOGICAL CHEMISTRY | 1 | Dr.K.VenugopalRao Asst Prof | Dept of Pharma Biotech | 9849170415 |
| 11 | | 2 | Dr.M.RAMCHANDER Asst Prof | Dept of Biochemistry(MGU,NL G) | 9989427725 |
| 12 | | 3 | Dr.K.Premasagar Asst Prof | HOD Dept of Biotech, MGU, NLG | 9989427725 850275976 |
| 13 | THIRD YEAR (PAPER-V) MOLECULAR BIOLOGY | 1 | Dr.K.Premasagar Asst Prof | HOD Dept of Biotech, MGU, NLG | 9989427725 |
| 14 | | 2 | Dr.M.RAMCHANDER Asst Prof | Dept of Biochemistry(MGU,NL G) | 9989427725 |
| 15 | | 3 | Dr.Mahender Aileni Asst Prof | Dept of Pharmaceutical Biotechnology | 9848705652 |
| 16 | THIRD YEAR (PAPER-VI Advanced ELECTIVES) Genetic Engineering & Immunology/En vironmental Biotechnology | 1 | Dr.M.RAMCHANDER Asst Prof | Dept of Biochemistry(MGU,NL G) | 9989427725 |
| 17 | | 2 | Dr.K.VenugopalRao Asst Prof | Dept of Pharma Biotech | 9849170415 |
| 18 | | 3 | Dr.T.Sivaram Asst Prof | HOD Dept of Biotech, MGU, NLG Dept | 9032694559 |
| 19 | THIRD YEAR (PAPER-VII) ANIMAL & PLANT BIOTECHNOLOGY | 1 | Dr.K.VenugopalRao Asst Prof | Dept of Pharma Biotech | 9849170415 |
| 20 | | 2 | Dr.M.RAMCHANDER Asst Prof | Dept of Biochemistry(MGU,NL G) | 9989427725 |
| 21 | | 3 | Dr.Mahender Aileni Asst Prof | Dept of Pharmaceutical Biotechnology | 9848705652 |
| 22 | THIRD YEAR(PAPER- VIII Applied electives) Industrial Biotechnology/Fo od science and technology | 1 | Dr.M.RAMCHANDER Asst Prof | Dept of Biochemistry(MGU,NL G) | 9989427725 |
| 23 | | 2 | Dr.K.VenugopalRao Asst Prof | Dept of Pharma Biotech | 9849170415 |
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