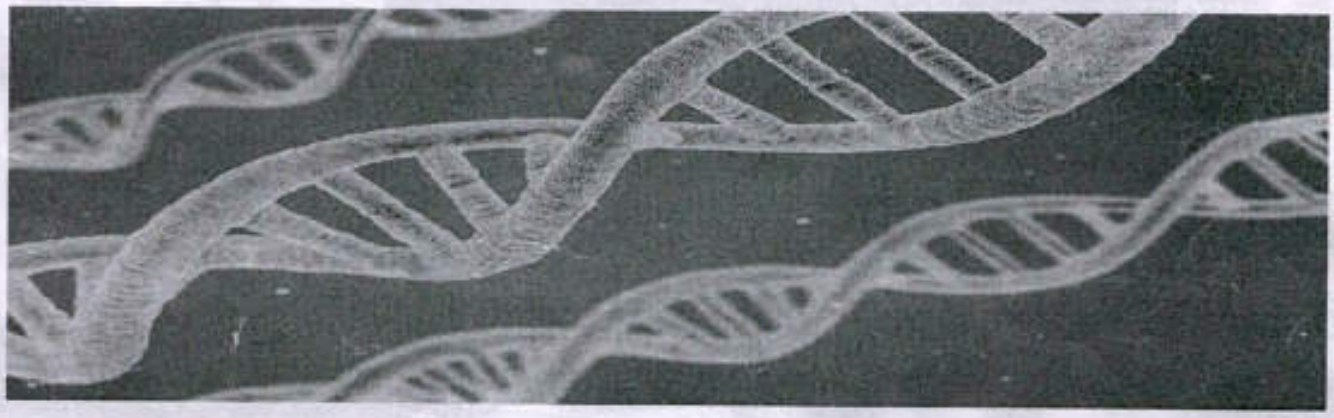
NAGARJUNA GOVERNMENT COLLEGE (AUTONOMOUS), NALGONDA

DEPARTMENT OF BIOTECHNOLOGY

BOS

BOARD OF STUDIES - 2020-21



DEPARTMENT OF BIOTECHNOLOGY

BOARD OF STUDIES

Board of studies in the Department of Biotechnology has been constituted with the following members for the year 2020-21

S.NO	Category	Name and Designation
1.	**Chairman Board of Studies**	**Sri. Yasala Yadagiri Rao, Asst.Prof,** Incharge Dept.of Biotechnology, Nagarjuna Govt.Degree College,Nalgonda
2.	**University Nominee**	**Sri. Dr. T. Siva Ram , Asst.Prof,** Dept .of Applied Biosciences University college of science & Informatics ,MGU ,Nalgonda.
3.	**Subject expert from Outside college**	1. **Sri. Dr .M.Ramchander ,Asst. Prof** Dept .of Biochemistry,MGU ,Nalgonda. 2. **Smt. Dr.K.Madhuri, Asst. Prof,** Dept .of Applied Biosciences University college of science & Informatics ,MGU ,Nalgonda.

HEAD I/C
Dept. of Applied Biosciences
University College of Sciences Informatics
Mahatma Gandhi University, NALGONDA.

Dr. K. MADHURI
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NAGARJUNA GOVERNMENT COLLEGE
(Autonomous)
DEPARTMENT OF BIOTECHNOLOGY
BOARD OF STUDIES MEETING

The Board of studies in the Department of Biotechnology met on Date 23 - 11 - 2020 under the chairmanship of **Sri, Y.Yadagiri Rao,Asst.Prof** In-Charge Dept. of Biotechnology the Board of studies and adopted the following Resolutions.

1. Continuation of Choice Based Credit System(CBCS)for B.Sc I ,II& III year from academic year 2020-2021.
2. To consider and approve CBCS and CGPA system for ,I,II &III year students.
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& III year for year .
6. To pass in examination one has to get a minimum of **40% of marks in each paper**.
7. Conducting of I internal and II internal in the academic year.
8. To Design Semester question papesr in the following pattern:

Section-A

I ,II& III year in to give 5 Questions and ask the students to answer all Questions(VSA) 5x2=10.

Section-B

To give 6 Questions and ask the students to answer 4 Questions (SA) 4x5=20.

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. Approve the panel of examiners for paper setting and evaluation for the year 2020-21

1. Chairman Board of Studies:

Sri. Y. Yadagiri Rao, Asst.Prof
In-Charge Dept. of Biotechnology
N.G. College, Nalgonda.

2. University Nominee

Sri. Dr.T.Siva Ram Asst. Prof.
Dept. of Applied bio sciences,
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3. Subject expert-from outside college

Sri. Dr .M.Ramchander ,Asst. Prof
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Sri.Dr.K.Madhuri, Asst. Prof
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Annexure-I

CBCS Structure from 2018-19 for Undergraduate Courses

Course		Papers	Total Credits	Credits for each BA						Credits for each B.Com						Credits for each B.Sc.					
				I	II	III	IV	V	VI	I	II	III	IV	V	VI	I	II	III	IV	V	VI
Core Courses (DSC)	Optional-1	4	20	5	5	5	5	-	-	5	5	5	5	-	-	5	5	5	5	-	-
	Optional-2	4	20	5	5	5	5	-	-	5	5	5	5	-	-	5	5	5	5	-	-
	Optional-3	4	20	5	5	5	5	-	-	5	5	5	5	-	-	5	5	5	5	-	-
Elective Courses (DSE)	Optional-1	2	10	-	-	-	-	5	5	-	-	-	-	5	5	-	-	-	-	5	5
	Optional-2	2	10	-	-	-	-	5	5	-	-	-	-	5	5	-	-	-	-	5	5
	Optional-3	2	10	-	-	-	-	5	5	-	-	-	-	5	5	-	-	-	-	5	5
Language	English	6	20	4	4	3	3	3	3	4	4	3	3	3	3	4	4	3	3	3	3
	MIL (Tel/Hin/Urdu)	6	20	4	4	3	3	3	3	4	4	3	3	3	3	4	4	3	3	3	3
Ability Enhancement Compulsory Course (AECC)	Envi. Science	1	2	2	-	-	-	-	-	2	-	-	-	-	-	2	-	-	-	-	-
	Gender Sensitization	1	2	-	2	-	-	-	-	-	2	-	-	-	-	-	2	-	-	-	-
Skill Enhancement Course (SEC)	SEC-1	1	2	-	-	2	-	-	-	-	-	2	-	-	-	-	-	2	-	-	-
	SEC-2	1	2	-	-	2	-	-	-	-	-	2	-	-	-	-	-	2	-	-	-
	SEC-3	1	2	-	-	-	2	-	-	-	-	-	2	-	-	-	-	-	2	-	-
	SEC-4	1	2	-	-	-	2	-	-	-	-	-	2	-	-	-	-	-	2	-	-
Generic Elective	Open Stream	1	4	-	-	-	-	4	-	-	-	-	-	4	-	-	-	-	-	4	-
Project/ Adv. Studies	Optionals	1	4	-	-	-	-	-	4	-	-	-	-	-	4	-	-	-	-	-	4
Total Credits in each Semester				25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Total Credits in UG				150						150						150					
Credit under Non-CGPA	NSS/NCC/Sports/ Extra Cur.			Upto 6 (2 in each year)						Upto 6 (2 in each year)						Upto 6 (2 in each year)					
	Summer Internship			Upto 4 (2 after I & II year)						Upto 4 (2 after I & II year)						Upto 4 (2 after I & II year)					

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NAGARJUNA GOVERNMENT COLLEGE, NALGONDA
(AUTONOMOUS)
ALLOCATION OF CREDITS AT SUBJECT LEVEL
College: N.GCOLLEGE Course: B.Sc I,II,IIIYEAR.,
Subject:BIOTECHNOLOGY

	FIRST YEAR- SEMESTER I			
CODE	**COURSE TITLE**	**COURSE TYPE**	**HPW**	**CREDITS**
BS101	EVS/Basic computer skills	AECC-1	2	2
BS102	English	CC-1A	4	4
BS103	Second language	CC-2A	4	4
BS104	**Optional I-Cell biology and Genetics**	**DSC-1A**	**4T+2P**	**5**
BS105	Optional II	DSC-2A	----------	5
BS106	Optional III	DSC-3A	----------	5
	TOTAL			**25**
	FIRST YEAR- SEMESTER II			
BS201	Gender sensitization	AECC-2	2	2
BS202	English	CC-1B	4	4
BS203	Second language	CC-2B	4	4
BS204	**Optional I-Biological chemistry and Microbiology**	**DSC-1B**	**4T+2P**	**5**
BS205	Optional II	DSC-2B	----------	5
BS206	Optional III	DSC-3B	----------	5
	TOTAL			**25**

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	SECOND YEAR-SEMESTER III			
BS301	Medical diagnostics// Basic Analytical chemistry	SEC-1	2	2
BS302		SEC-2	2	2
BS303	English	CC-1C	3	3
BS304	Second language	CC-2C	3	3
BS305	**Optional I-Molecular Biology and Recombinant DNA Technology**	**DSC-1C**	**4T+2P**	**5**
BS306	Optional II	DSC-2C	----------	5
BS307	Optional III	DSC-3C	----------	5
	TOTAL			**25**
	SECOND YEAR-SEMESTER IV			
BS401	Apiculture/Food Adulteration	SEC-3	2	2
BS402	SEC	SEC-4	2	2
BS403	English	CC-1D	3	3
BS404	Second language	CC-2D	3	3
BS405	**Optional I-Bioinforamtics and Biostatistics**	**DSC-1D**	**4T+2P**	**5**
BS406	Optional II	DSC-2D	----------	5
BS407	Optional III	DSC-3D	----------	5
	TOTAL			**25**

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THIRD YEAR-SEMESTER V				CREDITS	Max.Marks
BS501	English	CC-1E	3	3	
BS502	Second language	CC-2E	3	3	
BS503	GENERIC ELECTIVE (Legal Literacy)	GE	4T	4	
BS504	**Plant Biotechnology**	**DSE-1E**	**4T+2P**	**5**	**T-100 P-50**
BS505	Optional II	DSC-2E	4T+2P	5	
BS506	Optional III	DSC-3E	4T+2P	5	
	TOTAL			**25**	
THIRD YEAR-SEMESTER VI					
BS601	English	CC-1F	3	3	
BS602	Second language	CC-2F	3	3	
BS603	**Animal biotechnology**	**DSE-1F**	**4T+2P**	**5**	**T-100 P-50**
BS604	**ADVANCED ELECTIVE (Environmental Biotechnology & Bidiversity) / PROJECT**	**OPTIONAL**	**4T**	**4**	**T-100**
BS605	Optional II A/B	DSC-2F	4T+2P	5	
BS606	Optional III A/B	DSC-3F	4T+2P	5	
	TOTAL			**25**	
	TOTAL CREDITS			**150**	

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NAGARJUNA GOVERNMENT COLLEGE(A)
DEPARTMENT OF BIOTECHNOLOGY
SEMESTER-I CORE COURSE DCS -1THEORY-I

CELL BIOLOGY AND GENETICS

BSc Biotechnology Syllabus wef 2019 onwards

1. Unit : Cell structure and Functions
   - 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 non- histones), specialized chromosomes (Polytene, Lampbrush)
   - 1.6. Chromosomal aberrations- structural and numerical
2. Unit : Cell Division and 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
3. Unit : 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- Dihybrid Ratio,Trihybrid Ratio
   - 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 alleleism (eg: Coat color in Rabbits, eye color in Drosophila and ABO Blood groups)
   - 3.6. X-Y chromosomes - Sex determination in Drosophila, Man, X-linked inheritance– Hemophilia and Color blindness; X-inactivation.
4. Unit : 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 coilng in snail), variegation in leaves of Mirabilis jalapa
   - 4.3. Cytoplasmic male sterility in Maize.
   - 4.4. Mitochondrial inheritance in human and poky in Neurospora crassa
   - 4.5. Chloroplast inheritance in Chlamydomonas
   - 4.6. Hardy-Weinberg Equilibrium.

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NAGARJUNA GOVERNMENT COLLEGE(A)
DEPARTMENT OF BIOTECHNOLOGY wef 2019 onwards

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. Monohybrid and dihybrid ratio in Drosophila
6. Monohybrid and dihybrid ratio in Maize
7. Problems on co-dominance, epistasis, two point and three point test cross, gene mapping.
8. Statistical applications of Hardy-Weinberg Equilibrium

Spotters:

1. Prokaryotic Cell(Bacteria),
2. Mitochondria,
3. Chlorolplast,
4. Polytene Chromosomes,
5. Test Cross,
6. Blood Grouping,
7. Hemophilia Pedigree,
8. Crossing Over
9. Synaptonemal Complex,
10. Nucleosome Model.

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.
10. Cell Biology And Genetics by P.K. GUPT

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NAGARJUNA GOVERNMENT COLLEGE(AUTONOMOUS)

CELL BIOLOGY AND GENETICS SEMESTER-I PAPER-I

SECTION-A **Marks:70**

I.ANSWER THE FOLLOWING QUESTIONS **5x2=10M**

1.UNIT-I
2. UNIT-II
3.UNIT-III
4.UNIT-IV
5. FROM ANY ONE UNITS –I,II,III,IV ?

SECTION -B

II.ANSWER ANY FOUR OF THE FOLLOWING QUESTIONS **4x5=20M**

6.UNIT-I
7. UNIT-II
8. UNIT-III
9. UNIT-IV
10.UNIT-I&II
11.UNIT-III&IV

SECTION-C

III.ANSWER THE FOLLOWING QUESTIONS **4x10=40M**

12. UNIT-I
OR
UNIT-I

13
UNIT-II
OR
UNIT-II

14. UNIT-III
OR
UNIT-III

15.
UNIT-IV
OR
UNIT-IV

1.

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NAGARJUNA GOVERNMENT COLLEGE(AUTONOMOUS)

SEMESTER-II CORE COURSE THEORY-II
BIOLOGICAL CHEMISTRY AND MICROBIOLOGY

Unit 1: Biomolecules

1. Carbohydrates- importance, classification; structure and functions of monosaccharides (glucose & fructose), disaccharides (sucrose, lactose & maltose) and polysachharides (starch, glycogen & insulin)
2. Amino acids- importance, classification, structure, physical and chemical properties of amino acids; peptide bond formation
3. Proteins- importance, structure of proteins- primary, secondary, tertiary and quaternary
4. Lipids- importance, classification- simple lipids (triacylglycerides & waxes), complex lipids (phospholipids & glycolipids), derived lipids (steroids, terpenes & carotenoids)
5. Nucleic acids :structure and chemistry of DNA (Watson and crick) and RNA(TMV) Structure and forms of DNA (A, B and Z)
6. Enzymes- importance, classification and nomenclature; Michaelis-Menton Equation, factors influencing the enzyme reactions; enzyme inhibition (competitive, uncompetitive & mixed), co-enzymes

Unit 2: Bioenergetics

1. Glycolysis, Tricarboxylic Acid (TCA) Cycle,
2. Electron Transport, Oxidative Phosphorylation
3. Gluconeogenesis and its significance
4. Transamination and Oxidative deamination reactions of amino acids
5. B-Oxidation of Fatty acids
6. Glyoxalate cycle.

Unit 3 : Fundamentals of Microbiology

1. Historical development of Microbiology and contributors of microbiology
2. Microscopy: Bright field microscopy, Dark field microscopy, Phase contrast microscopy, Flourescent microscopy, scanning and Transmission Electron microscopy.
3. Outlines of classification of Microorganisms
4. Structure and general characteristics of Bacteria
5. Structure and general characteristics of Virus
6. Structure and general characteristics of Micro algae and Fungi

Unit 4: Culture and identification of microorganisms

1. Methods of sterilization- physical and chemical methods
2. Bacterial nutrition nutritional types of bacteria, essential macro micro nutrients and growth factors.
3. Bacterial growth curve-batch and continuous cultures, synchronous cultures measurement of bacterial growth-measurement of cell number and cell mass.
4. Factors affecting bacterial growth
5. Culturing of anaerobic bacteria and viruses
6. Pure cultures and its characteristics.

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NAGARJUNA GOVERNMENT COLLEGE(A)

DEPARTMENT OF BIOTECHNOLOGY

PRACTICALS

BS306: BIOCHEMISTRY AND MICROBIOLOGY

1. Preparation of normal molar, molal solutions.
2. Preparation of buffers (acidic, basic ,neutral)
3. Qualitative tests of sugars, amino acids and lipids
4. Estimation of total sugars by anthrone method
5. Separation of amino acids by paper chromatography
6. Estimation of proteins by biuret method
7. Sterilization methods
8. Preparation of microbiological media (bacterial, algal & fungal)
9. Isolation of bacteria by streak, spread and pour plate methods
10. Isolation of bacteria from soil
11. Simple staining and differential staining (gram's staining)
12. Bacterial growth curve
13. Technique of micrometry(ocular and stage)

Spotters:

1. Osazone
2. Globular protein
3. Lock and key model
4. Completive inhibition
5. RUBISCO
6. ATP synthase
7. Autoclave
8. Laminar air flow
9. Tyndalization
10. Bacterial growth curve
11. Hot air oven
12. Serial dilution technique

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: AlanFersht
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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BIOLOGICAL CHEMISTRY AND MICROBIOLOGY

SEMESTER-II PAPER-II

SECTION-A **Marks:70**

I.ANSWER THE FOLLOWING QUESTIONS **5x2=10M**

1.UNIT-I
2. UNIT-II
3.UNIT-III
4.UNIT-IV
5. FROM ANY ONE UNITS –I,II,III,IV ?

SECTION -B

II.ANSWER ANY FOUR OF THE FOLLOWING QUESTIONS **4x5=20M**

6.UNIT-I
7. UNIT-II
8. UNIT-III
9. UNIT-IV
10.UNIT-I&II
11.UNIT-III&IV

SECTION-C

III.ANSWER THE FOLLOWING QUESTIONS **4x10=40M**

12. UNIT-I
OR
UNIT-I

13
UNIT-II
OR
UNIT-II

14. UNIT-III
OR
UNIT-III

15.
UNIT-IV
OR
UNIT-IV

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B.Sc BIOTECHNOLOGY II YEAR
SEMESTR-III PAPER - III
MOLECULAR BIOLOGY AND RECOMBINANT DNA TECHNOLOGY

1.UNIT:GENOME ORGANIZATION AND DNA REPLICATION

1.1 DNA as the genetic material –Griffiths transformation experiment,Avery,Macleod and McCarty's experiment and Hershey &Chase phage –labelling experiment,RNA as genetic material-Tobacco mosaic virus
1.2 Organization of prokaryotic genome and eukaryotic nuclear genome and eukaryotic nuclear genome
1.3 Organization of Mitochondrial and chloroplast genomes
1.4 DNA replication-enzymes involved in the replication of DNA ,origin of replication fork
1.5 Replication of prokaryotic genome and nuclear genome of eukaryotes
1.6 Mutations –types of mutations, spontaneous mutations and induced mutations.

2.UNIT: GENE EXPRESSION IN PROKARYOTES AND EUKARYOTES

2.1 Structure of prokaryotic gene; Structure of eukaryotic gene; structure and functions of prokaryotic RNA polymerase-subunits
2.2 Transcriptional machinery in eukaryotes (RNA polymerases) and their structural and functional features
2.3 Genetic code-properties, deciphering of genetic code, Wobble hypothesis
2.4 Transcription mechanism in prokaryotes – initiation ,elongation & proof reading ,termination (rho independent & rho dependent)
2.5 Transcription in eukaryotes-Initiation, elongation & termination factors
2.6 Translation mechanism-initation, elongation and termination

3.UNIT:GENE REGULATION IN PROKARYOTES AND EUKARYOTES

3.1 Prokaryotic trancriptional regulational regulation (inducible system)-operon concept, lac operon & glucose effect
3.2 Prokaryotic transcriptional regulation (repressible system)-tryptophan operon
3.3 Post –transcriptional modifications –capping, poly-adenylation
3.4 splicing and alternate splicing
3.5 Post –translational modifications – glycosylation.acetylation,and ubiquitination
3.6 Gal regulation in yeast-mating type gene switching

4.UNIT:RECOMBINANT DNA TECHNOLOGY

4.1 Enzymes used in Molecular cloning ;restriction endonuclease, DNA ligases, polynuleotide kinase ,Klenow enzymes and DNA polymerase
4.2 Cloning vectors: PBR 322,bacteriophage,cosmid,phagemid,shuttle vectors
4.3 Vectors for library preparation (lambda phage vectors, cosmids, BAC& YAC)
4.4 Gene transfer techniques: physical, chemical and biological methods
4.5 Selection of recombinant DNA technologies-agriculture,diagnostics,industrial,pharmaceutics and medicine

4.5

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NAGARJUNA GOVERNMENT COLLEGE(A)
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PRACTICALS
MOLECULAR BIOLOGY AND RECOMBINANT DNA TECHNOLOGY

1.Isolation of DNA from bacterial cells
2.Isoaltion pf plasmid DNA
3.Agrose gel electrophoresis of DNA
4. Quantification of DNA by spectrophotometer
5. Seperation of proteins by SDS-PAGE
6.Polymerase Chain Reaction
7. Restriction digestion of DNA
8.Bacterial transformation

Spotters:
1.PCR
2.RNA Polymerase
3.Okazaki fragments
4.Plasmid vector map
5.Prokaryotic gene
6.Eukaryotic gene
7.splicing
8.Post transcriptional modifications
9.point mutations
10.Lac operon
11.Tryptophan operon
12.Post translational modifications(PTMS)

REFERENCE BOOKS

1.Molecular biology of the cell by alberts,b,Bray.d.lewis j.Raff .M.Roberts,K and Watson, J.D.Garland Publishers.Oxford
2. Molecular Biology of the Gene - By Watson, Hopkins, Goberts, Steitz and Weiner (Pearson Education)
3. Text Book of Biotechnology - By H.K. Das (Wiley Publications)
4. Gene Structure & Expression - By J.D. Howkins, Publ: Cambridge
5. Test Book of Molecular Biology - By K.S. Sastry, G. Padmanabhan & C. Subramanyan, Publ: Macmillan India
6. Principles of Gene Manipulation - By R.W. Old & S.B. Primrose, Publ: Blackwell
7. Genes - By B. Lewin - Oxford Univ. Press
8. Molecular Biology &Biotechnol - By H.D. Kumar, Publ: Vikas
9. Methods for General & Molecular Bacteriology - By P. Gerhardf et al., Publ: ASM
10. Molecular Biotechnology - By G.R. Click and J.J. Pasternak, Publ: Panima
11. Genes and Genomes – By Maxine Singer and Paul Berg
12. Molecular Biology - By D. Freifelder, Publ: Narosa
13. Molecular biology. By:F.Weaver. WCB/McGraw Hill
14. Gene, Genomics and Genetic Engineering - By Irfan Ali Khan and AtiyaKhanum (Ukaaz Publications)

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NAGARJUNA GOVERNMENT COLLEGE(A)

DEPARTMENT OF BIOTECHNOLOGY

SEMESTER – III PAPER – III

MOLECULAR BIOLOGY AND RECOMBINANT DNA TECHNOLOGY

SECTION-A **Marks:70**

I.ANSWER THE FOLLOWING QUESTIONS **5x2=10M**

1.UNIT-I
2. UNIT-II
3.UNIT-III
4.UNIT-IV
5. FROM ANY ONE UNITS –I,II,III,IV ?

SECTION -B

II.ANSWER ANY FOUR OF THE FOLLOWING QUESTIONS **4x5=20M**

6.UNIT-I
7. UNIT-II
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9. UNIT-IV
10.UNIT-I&II
11.UNIT-III&IV

SECTION-C

III.ANSWER THE FOLLOWING QUESTIONS **4x10=40M**

12. UNIT-I
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UNIT-IV
OR
UNIT-IV

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B.Sc BIOTECHNOLOGY II YEAR

SEMESTR-IV PAPER - IV
BIOINFORMATICS AND BIOSTATISTICS

1.UNIT :INTRODUCTION TO BIOINFORMATICS AND BIOLOGICAL DATABASES

1. Bioinformatics definition ,history,scope and applications
2. Bioinformatics tools and resources –internet basics ,role of internet,free online tools,downloadable free tools
3. Bioinformatics web portals-NCBI,EBI,ExPASy
4. Biological databases: (Classification of databases-primary (Genbank),secondary (PIR) AND TERTIARY OR COMPOSITE (KEGG) DATABASES
5. Sequence databases-DNA sequence databases (ENA & DDBJ)
6. Protein sequences databases (Swissprot &PROSITE)

2.UNIT:SEQUENCE ALIGNMENT

1. Basics of sequence alignment-match, mismatch ,gaps ,gap penalties, scoring alignment
2. Types of sequence alignment-pairwise and multiple alignment ,local and global alignment
3. Dot matrix comparison of sequences
4. Scoring matrices-PAM and BLOSUM
5. Pairwise sequence similarity search by BLAST and FASTA
6. Concepts of phylogeny-distance based (NJmethod) and character based (ML method),tree construction methods

3.UNIT: DESCRIPTIVE BIOSTATISTICS AND PROBABILITY

1. Introduction to biostatistics,kinds of data and variables –based on nature (numerical –discrete and continuous ,categorical-ordinal and nominal)-based on source (primary and secondary data),sample size ,sampling methods and sampling errors
2. Data tabulation and representation methods ,graphical methods-stem and leaf plot,line diagram,bar graphs,histogram,frequency polygon,frequency curves,diagrammatic method-pie diagram
3. Measures of central tendency-mean ,median,mode,merits and demerits
4. Measures of dispersion –range,variance ,standard deviation, standard error and coefficient of variation,merits and demerits
5. Concepts pf probability-random experiment ,events, probability of an event, probability rules(discrete and continuous)
6. Probaility distributions:binomial &Poisson distributions for discrete variables, Normal distribution for continuous variables

4.UNIT:APPLICATIONS OF BIOSTATISTICS

1. Hypothesis testing-steps in testing for statistical hypothesis ,null and alternative hypothesis ,level of significance-type-1 and type-2 errors
2. Test of significance for small samples-students's test (one sample and two samples)
3. Test of significance for large samples-Z test for means and proportions
4. Chi-square test and its applications-good ness of fit ,test of independence
5. Analysis of variance (ANOVA) –one way analysis
6. Correlation –definition,simple and linear analysis ,Karl Pearson's correlation coefficient

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NAGARJUNA GOVERNMENT COLLEGE(A)

DEPARTMENT OF BIOTECHNOLOGY

SEMESTR-IV PAPER-IV

BIOINFORMATICS AND BIOSTATISTICS

PRACTICALS

1. Exploring web portals-NCBI,EBI & ExPASy
2. Literature search through Pubmed and Pubmed Central
3. Sequence retrieval from Genbank ,ENA,Swissprof
4. pairwise homology search by BLAST and FASTA
5. Calculation of mean,median mode standard deviation ,variance,standard error and coeefficent of variation
6. Construction of bar diagram,pie diagram,line diagram,histogram
7. Problems on hypothesis testing using Z-test,t-test, and Chi-square test
8. Problems on probability and probability distributions

Spotters:

1.Line diagram,bar diagram & pie diagrams
2.Histogram,frequency polygon & frequency curve
3.Normal Probable curve
4.GenBank
5.DDBJ
6.SWISS-PROT
7.PROSITE
8.PIR
9.BLAST
10.Pairwise alignment
11.Multiple sequence alignment
12.PAM and BLOSUM
13.Phylogenetic tree

RECOMMENDED BOOKS

1.Khan & Khanum (2004),Fundamentals of Biostatistics,II Revised edition,UkaazPublication
2.Bailey,N.T.J ,Statistical methods in biology,Cambridge Univ.Press
3.Fundamentals of Biostatistics,P.Hanmantharao and K Janardhan
4.Danial,W.W,Biostatistics,Wiley
5.Introduciton to bioinformatics by Auther M lesk
6.Developing Bioinformatics ComputerSkills by Cynthia gibas,per Jambeck
7.Bioinfromatics second edition by David M Mount

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NAGARJUNA GOVERNMENT COLLEGE(A)

DEPARTMENT OF BIOTECHNOLOGY

SEMESTR-IV PAPER-IV

BIOINFORMATICS AND BIOSTATISTICS

SECTION-A **Marks:70**

I.ANSWER THE FOLLOWING QUESTIONS **5x2=10M**

1.UNIT-I
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5. FROM ANY ONE UNITS –I,II,III,IV ?

SECTION -B

II.ANSWER ANY FOUR OF THE FOLLOWING QUESTIONS **4x5=20M**

6.UNIT-I
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SECTION-C

III.ANSWER THE FOLLOWING QUESTIONS **4x10=40M**

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NAGARJUNA GOVERNMENT COLLEGE, NALGONDA

SEMESTER V PAPER –

ELECTIVE THEORY

PLANT BIOTECHNOLOGY

Unit 1: Basics to Plant Biotechnology

1.1 Introduction to plant tissue culture, totipotency of plant cells (dedifferentiation, redifferentiation, regeneration of whole plant)

1.2 Nutritional requirements for plant tissue culture: nutrient media – macronutrients and micronutrients, media additives (carbon source, vitamins, amino acids)

1.3 Plant growth regulators (cytokinins, auxins, gibberellins), gelling agents

1.4 Preparation of media, selection and surface sterilization of explants, inoculation, incubation (temperature and light regime), regeneration of plants

1.5 Initiation of callus cultures and cell suspension cultures

1.6 Regeneration of plants (Organogenesis and embryogenesis)

Unit 2: Applications of Plant Tissue Culture

2.1 Meristem culture and production of disease free plants

2.2 Micro propagation of elite ornamental, horticultural plants via organogenesis and somatic embryogenesis, Encapsulation and production of synthetics seeds

2.3 Cell suspension cultures (batch and continuous culture) for production of secondary metabolites

2.4 Embryo culture and embryo rescue; Protoplast culture and fusion, Development of somatic hybrids and Cybrids and their applications

2.5 Somaclonal variation and their applications; production of haploids, Isogenic lines, Anther and pollen culture

2.6 Methods of cryopreservation for conservation of plant germplasm

Unit 3: Techniques for production of transgenic plants and applications

3.1 Introduction to Agrobacterium tumifaciens, Features of Ti Plasmid, molecular mechanism of T-DNA transfer

3.2 Agrobacterium mediated gene transfer method

3.3 Direct gene transfer methods – Particle Bombardment (Gene Gun)

3.4 Production of transgenic plant for Biotic and Abiotic stresses

3.5 Molecular Farming – Production of biopharmaceuticals in transgenic plants

3.6 Improvement of nutritional quality of crops (vitamins, amino acids, oil, micronutrients)

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NAGARJUNA GOVERNMENT COLLEGE(A)

DEPARTMENT OF BIOTECHNOLOGY

Core-V: PRACTICALS

1.Preparation of media for tissue culture
2.Surface sterilization methods of explants (seed leaf, inter node and root) and inoculation
3.Seed culture
4.Establishment of callus cultures– from carrot
5.Cell suspension cultures
6.Protoplast isolation and culture
7.Protoplast fusion

REFERENCE BOOKS

1.Plant Tissue Culture and its Biotechnological Applications By W. Barz, E. Reinhard, M.H.Zenk
2.Plant Tissue Culture By Akio Fujiwara
3.Frontiers of Plant Tissue Culture By Trevor A. Thorpe
4.In vitro Haploid Production in Higher Plants by S. Mohan Jain, S.K. Sopory, R.E. Veilleux
5.Plant Tissue Culture : Theory and Practice By S.S. Bhojwani and A. Razdan
6.Plant Cell, Tissue and Organ Culture, Applied and Fundamental Aspects By Y.P.S. Bajaj andA. Reinhard

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NAGARJUNA GOVERNMENT COLLEGE
(AUTONOMOUS)
PLANT BIOTECHNOLOGY
SEMESTER-V
ELECTIVE

SECTION-A **Marks:70**

I.ANSWER THE FOLLOWING QUESTIONS **5x2=10M**

1.UNIT-I
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SECTION -B

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SECTION-C

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SEMESTER VI

ELECTIVE THEORY

ANIMAL BIOTECHNOLOGY

Unit 1: Animal diversity and Cataloguing of germplasm

1.1 Conventional methods of Animal Breeding: Selective and Cross breeding
1.2 Embryo Biotechniques for augmentation of replication efficiency and faster Multiplication of superior germplasm
1.3 Cryopreservation of germplasm
1.4 Artificial insemination: Super ovulation, Oestrus synchronization, embryo collection and transfer
1.5 In vitro maturation of Oocytes, In vitro fertilization, embryo culture, preservation
1.6 Economically important livestock, Conservation of genetic resources

Unit 2: Animal Improvement for desired traits by biotechnology Interventions

2.1 Scope for biotechnological interventions (Buffalo as multipurpose livestock)
2.2 Model organisms and their significance (Cattle, Rodents and Fish)
2.3 DNA Micromanipulation
2.4 Somatic cell nuclear transfer
2.5 Embryo sexing
2.6 Gene mapping and Identification of genes of economic importance in farm Animals

Unit 3: Developments in molecular markers in Livestock and Transgenic Animals

3.1 Developments in livestock genomics (estimated breeding value, ebv)
3.2 Molecular markers and applications
3.3 Development of transgenic animals
3.4 Applications of transgenic animals in milk production, meat production and aquaculture
3.5 Transgenic technology for development of animals as bioreactors
3.6 Ethical considerations for transgenic animals

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NAGARJUNA GOVERNMENT COLLEGE(A)
DEPARTMENT OF BIOTECHNOLOGY
ELECTIVE

PRACTICALS

1. Preparation of media
2. Isolation of cells from Chicken Liver
3. Isolation of cells from Chick Embryo
4. Preparation of somatic metaphase chromosomes
5. Karyotyping- banding procedures for comparing the chromosomal complement
6. Screening of chromosomal abnormalities

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

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NAGARJUNA GOVERNMENT COLLEGE
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SEMESTER VI
ELECTIVE THEORY
ANIMAL BIOTECHNOLOGY

SECTION-A **Marks:70**

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SECTION -B

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SEMESTER-VI

(ADVANCED ELECTIVE)

ENVIRONMENTAL BIOTECHNOLOGY AND BIODIVERSITY

Unit 1: Environmental Pollution

1.1 Introduction to environment and pollution
1.2 Types of pollution- air, water and land pollutions
1.3 Types of pollutants– inorganic, organic and biotic sources
1.4 Sources of pollution – domestic waste, agricultural waste, industrial effluents and municipal waste
1.5 Climate change, greenhouse gases and global warming
1.6 Impact of pollution on environment and measurement methods

Unit 2: Bioenergy and Bio-fuels

2.1 Renewable and non- renewable energy resources
2.2 Fossil fuels as energy source and their impact on environment
2.3 Non-conventional source – biomass as source of bioenergy
2.4 Types of biomass – plant, animal and microbial biomass
2.5 Production of biofuels: bioethanol
2.6 Production of biomethane, biohydrogen

Unit 3: Bioremediation and Restoration of Environment

3.1 Microbial treatment of waste water (sewage of industrial effluent)- aerobic and anaerobic methods
3.2 Solid waste and management; Bioremediation– concepts and types (in-situ and ex-situ); Bioremediation of toxic metal
ions– biosorption and bioaccumulation
3.3 Composting of organic wastes
3.4 Microbial bioremediation of pesticides and Xenobiotic compounds
3.5 Phytoremediation- concepts and application
3.6 Conservation of biodiversity

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NAGARJUNA GOVERNMENT COLLEGE
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SEMESTER-VI
(ADVANCED ELECTIVE)
ENVIRONMENTAL BIOTECHNOLOGY AND BIODIVERSITY

SECTION-A **Marks:70**

I.ANSWER THE FOLLOWING QUESTIONS **5x2=10M**

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NAGARJUNA GOVERNMENT COLLEGE(A), NALGONDA

PANEL OF EXAMINERS FOR THE ACADEMIC YEAR 2020-21
DEPARTMENT OF BIOTECHNOLOGY

S.NO	SUBJECT	S.NO	Name Designation ,Working address /Mobile no/Email.ID	Residential Address	Remarks
1.	FIRST YEAR (PAPER-I) CELL BIOLOGY AND GENETICS	1	Dr.T.Siva Ram Asst.Prof	Dept.of.Applied biosciences,MGU,Nlg	9032694559
		2.	Dr.K.Premsagar Asst.Prof	Dept.of.Applied biosciences,MGU,Nlg	8500275976
		3.	Dr.M.Thirumala Asst.Prof	Dept.of Biochemistry	9490705105
2.	FIRST YEAR (PAPER-II) BIOLOGICAL CHEMSITRY AND MICROBIOLOGY	1.	Dr.M.Ramchander ,Asst. Prof.	Dept.of.Applied biosciences,MGU,Nlg	9989427725
		2.	Dr.T.Siva Ram Asst.Prof	Dept.of. Applied Biosciences, MGU, Nlg	9032694559
		3.	Dr. K. Madhuri Asst.Prof	Dept.of.Applied biosciences,MGU,Nlg	900059597
3.	SECOND YEAR (PAPER-III) MOLECULAR BIOLOGY & RECOMBINANT DNA TECHNOLOGY	1.	Dr.K.Premsagar Asst.Prof	Dept.of.Applied biosciences,MGU,Nlg	8500275976
		2.	Dr.T.Siva Ram Asst.Prof	Dept.of.Applied biosciences,MGU,Nlg	9032694559
		3.	Dr. K. Madhuri Asst.Prof	Dept.of.Applied biosciences,MGU,Nlg	900059597
4.	SECOND YEAR (PAPER-IV) BIOINFORMATICS &BIOSTATISTICS	1.	Dr.T.Siva Ram Asst.Prof	Dept.of.Applied biosciences,MGU,Nlg	9032694559
		2.	Dr. K. Madhuri Asst.Prof	Dept.of.Applied biosciences,MGU,Nlg	900059597
		3.	Dr.K.Premsagar Asst.Prof	Dept.of.Applied biosciences,MGU,Nlg	8500275976

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S.NO	SUBJECT	S.NO	Name Designation ,Working address /Mobile no/Email.ID	Residential Address	Remarks
5.	THIRD YEAR (PAPER-V) PLANT BIOTECHNOLOGY	1	Dr.T.Siva Ram Asst.Prof	Dept.of.Applied biosciences,MGU,Nlg	9032694559
		2	Dr. K. Madhuri Asst.Prof	Dept.of.Applied biosciences,MGU,Nlg	900059597
		3	Dr.K.Premsagar Asst.Prof	Dept.of.Applied biosciences,MGU,Nlg	8500275976
6.	THIRD YEAR (PAPER-VI) ANIMAL BIOTECHNOLOGY	1	Dr. K. Madhuri Asst.Prof	Dept.of.Applied biosciences,MGU,Nlg	900059597
		2	Dr.K.Premsagar Asst.Prof	Dept.of.Applied biosciences,MGU,Nlg	8500275976
		3	Dr.T.Siva Ram Asst.Prof	Dept.of.Applied biosciences,MGU,Nlg	9032694559

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