Choice based Credit System (CBCS)For

B.Sc., (Biotechnology)

(Undergraduate Programme)

(Effective from the Academic Year 2019-20)

Department of Biotechnology

Sri Y N College (Autonomous)

Narsapur, Andhra Pradesh

Batch: 2017 – 20

SRI Y.N.COLLEGE (AUTONOMOUS), NARSAPUR

(Affiliated to Adikavi Nannayya University)

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I B.Sc BIOTECHNOLOGY

FIRST SEMESTER - PAPER I (A)

MICROBIOLOGY AND CELL BIOLOGY

UNIT I

History, Development and Microscopy

History and development of microbiology: contributions of Louis Pasteur, Robert Koch and Edward Jenner. Microscopy: Compound microscopy: Numerical aperture and its importance, resolving power, oil immersion objectives Electron microscopy: Principle, ray diagram and applications, TEM and SEM, comparison between optical and electron microscope, limitations of electron microscopy.

Stains and staining procedures: Acidic, basic and neutral stains, Gram staining, Acid fast staining, Flagella staining.

UNIT II

Bacteria: Bacterial morphology and sub cellular structures, general morphology of bacteria, shapes and sizes, generalized diagram of typical bacterial cell. Slime layer and capsule. Cell wall of gram +ve and Gram -ve cells, Prokaryotic classification. General account of flagella, plasmids; definition and kind of plasmids (conjugative and non-conjugative) F, R, and Col plasmids. A brief idea Bergey's manual. Morphology of archaea, archaeal cell membrane (differences between bacterial and archaeal cell membrane.

Viruses: General characteristics of viruses, difference between virus and typical microbial cell, structure, different shapes and symmetries with one example of each type, classification of viruses on the basis of nucleic acids, phage and animal cell viruses, example of each and their importance

UNIT III

Microbial Nutrition: Basic nutritional requirements: Basic idea of such nutrients as water, carbon, nitrogen, sulfur and vitamins etc., natural and synthetic media, nutritional classification of bacteria.

UNIT V

Biostatistics: Mean, median, mode, standard deviation, One-way Anova, Two-way Anova, ttest, F-test and chi-square.

Additional Input

- Types of DNA
- Types of RNA
- Chargaff's rule

BLUE PRINT

	ESSAY QUESTIONS	SHORTS ANSWER QUESTIONS
UNIT -I	2	2
UNIT -II	2	1
UNIT -III	2	2
UNIT -IV	2	1
UNIT -V	2	2

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T. Ramesh 6/7/19

B. Nageshwari 6/7/19

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I B.Sc BIOTECHNOLOGY

FRISRT SEMESTER – PAPER- I

BIOMOLECULES & ANALYTICAL TECHNIQUES

Time: 3 Hrs **Max Marks: 75M**

SECTION – A

1. **Answer any 5 questions. Each question carries 5 marks.** **5 X 5M = 25M**
1. Denaturation and Renaturation of Proteins.
2. Structure and functions of cholesterol.
3. Types of centrifugations.
4. Factors affecting electrophoretic migration.
5. Beer-Lambert's law.
6. Extinction coefficient.
7. Vitamin E
8. Gel permeation

Answer any FIVE of the following questions atleast TWO form each section B & C
Draw a labeled diagrams wherever necessary. Each question carries 10 marks.

5 X 10M = 50M

SECTION – B

9. Write about classification, structure and properties of amino acids
10. Explain biological role and deficiency manifestations of vitamin – A, B, C, D, E, K
11. Explain gel filtration chromatographic technique
12. Describe the basic principles and types of electrophoresis
13. Explain ANOVA

SECTION – C

14. Write about structure and classification of saturated and unsaturated fatty acids
15. Explain Glycolysis process with a flow chart
16. Explain about UV VIS spectrophotometer
17. Explain the measurements of radioactivity
18. Define mean, median and mode with examples

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I B.Sc; BIOTECHNOLOGY

SECOND SEMESTER – PAPER - II

MICROBIOLOGY , CELL AND MOLECULAR BIOLOGY

Aim and objectives of Course:

To ensure students gain knowledge about the microbiology, cell and molecular biology aspects

Learning outcomes of Course:

The course will provide an insight into basic aspects of microbiology, cell and molecular biology

Course Objectives:

To acquaint students with concepts of microbiology, cell and molecular biology. This course is aimed to give an understanding of the basics of microbiology, dealing types of microbes, classification and their characterization, structure and function of prokaryotic and eukaryotic cell organelles, cell division and basics of molecular biology including DNA replication, transcription, translation and regulation of gene expression.

UNIT I

Scope and Techniques of Microbiology: History and contribution of Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister and Alexander Fleming. Ultrastructure of bacteria and growth curve. Pure culture techniques. Sterilization techniques, principles and application of physical methods (autoclave, hot air oven, incineration), chemical methods and radiation methods. Simple, gram and acid-fast staining.

UNIT II

Microbial Taxonomy and Metabolism: Concepts of microbial species and strains. Classification of bacteria based on morphology, nutrition and environment. General characteristics, transmission and cultivation of viruses. Structure and properties of plant (tobacco mosaic virus, TMV), animal (Newcastle disease virus, NDV), human (Human immunodeficiency virus, HIV) and bacterial viruses (T4 phage).

UNIT III

Cell Structure and Functions: Structure, properties and functions of cellular organelles (Mitochondria, Ribosomes and Vacuoles) of eukaryotic cells. Cell cycle and cell division (mitosis and meiosis). Chemical composition and dynamic nature of the membrane

UNIT IV

DNA Replication, Repair and Regulation of Gene Expression: DNA replication in prokaryotes and eukaryotes (semi conservative, dispersive, conservative). Mechanism of DNA replication, enzymes and protein involved in DNA replication. DNA damage and repair. Regulation of gene expression in prokaryotes Lac operon concept.

UNIT V

Central Dogma of Molecular Biology: Genome organization of prokaryotic and eukaryotic organisms. Genetic code, prokaryotic and eukaryotic transcription, enzymes involved in transcription. Post-transcriptional modification (Capping Poly adenylation) and splicing.

Translation: mechanism of translation in prokaryotic and eukaryotic cells (initiation, elongation, termination). Post-translational modification (glycosylation and phosphorylation).

Additional Input

- Antibiotics
- Trp OPeron

BLUE PRINT

	ESSAY QUESTIONS	SHORTS ANSWER QUESTIONS
UNIT -I	2	2
UNIT -II	2	1
UNIT -III	2	2
UNIT -IV	2	1
UNIT -V	2	2

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II B.Sc BIOTECHNOLOGY

SECOND SEMESTER –PAPER- II

MICROBIOLOGY , CELLAND MOLECULAR BIOLOGY

Time: 3 Hrs **Max Marks: 75M**

SECTION – A

I .Answer any 5 questions. Each question carries 5 marks. **5 X 5M = 25M**

1. Contributions of Leeuwenhoek
2. Simple staining
3. General characteristics of virus
4. Mitochondria
5. DNA repair
6. Post-transcriptional modifications
7. Capping
8. Adenulation

Answer any FIVE of the following questions atleast TWO form each section B & C Draw a labeled diagrams wherever necessary. Each question carries 10 marks.

5 X 10M = 50M

SECTION – B

9. Give the ultra-structure of Bacteria and its growth curve with neat labelled diagram.
10. Explain classification of bacteria based on different criteria.
11. Explain the cell cycle and cell division.
12 What is replication and explain the process of replication in eukaryotes
13. Explain the process of transcription in eukaryotes

SECTION – C

14. Explain sterilization techniques.
15. Explain the structure properties of animal cells.
16. Explain the structure and properties of cell organelles.
17. What is Operon concept? Explain positive and negative control methods of lac operon
18. Write a note on post-translational modifications in prokaryotes

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II B.Sc; BIOTECHNOLOGY

THIRD SEMESTER – PAPER - III

IMMMUNOLOGY AND r DNA TECHNOLOGY

Aim and objectives of Course:

To acquaint students with concepts of immunology and recombinant DNA technology. This course is aimed to give an understanding of the basics of immunology dealing cells and organs of the immune system, types of immune responses, antigen-antibody interactions, vaccines and tools, techniques and strategies and applications of genetic engineering.

Learning outcomes of Course:

The course will provide an insight into basic aspects of immunology and rDNA technology

UNIT I

Concepts, Cells and Organs of the Immune System

Terminology, antigen, hapten, antibody (types), antigenicity, immunogenicity and types of immunity. Innate and adaptive immunity. Hematopoiesis, organs, tissues, cells and mediators of the immune system (primary and secondary lymphoid organs, lymphocytes and cytokines). Introduction to complement components, MHC. Basic concepts of humoral and cell-mediated immune response.

UNIT II

Vaccinology and Clinical Immunology

Live, killed, attenuated, subunit and recombinant vaccines. Role and properties of adjuvants. Hybridoma technology, monoclonal antibodies and their application in immunodiagnosis. Antigen and antibody interactions - precipitation, agglutination, immune diffusion and ELISA. Introduction to hypersensitivity and autoimmunity.

UNIT III

Introduction, Tools and Techniques of rDNA Technology

Introduction to rDNA technology, steps involved in cloning, tools of genetic engineering (Genes, Cloning vectors - plasmids and cosmids, Enzymes – restriction endonucleases and DNA Ligase, Hosts – bacteria and yeast). Principles and application of PCR.

Southern, Northern and Western Blotting. Introduction to DNA sequencing (Sanger Sequencing)

UNIT IV

Cloning Strategies and Application of rDNA Technology

rDNA library, construction, methods of transformation, recombinant selection and screening methods. Applications of rDNA technology in agriculture (transgenic plants, edible vaccines and antibodies) and medicine (DNA fingerprinting).

UNIT V

Bioinformatics

Databases (PubMed, NCBI, EMBL), nucleotide and protein BLAST analysis, and phylogenetic tree construction. Introduction to omics (proteomics, genomics and transcriptomics).

BLUE PRINT

	ESSAY QUESTIONS	SHORTS ANSWER QUESTIONS
UNIT -I	2	2
UNIT -II	2	1
UNIT -III	2	2
UNIT -IV	2	1
UNIT -V	2	2

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THIRD SEMESTER – PAPER- III

IMMMUNOLOGY AND r DNA TECHNOLOGY

Time: 3 Hrs **Max Marks: 75M**

SECTION – A

Answer any 5 questions. Each question carries 5 marks. **5 X 5M = 25M**

1. MHC
2. Hematopoiesis
3. Properties of Adjuvants
4. Monoclonal Antibodies Applications
5. Sanger Sequencing
6. Principle of PCR
7. DNA Fingerprinting
8. Proteomics

Answer any FIVE of the following questions atleast TWO form each section B & C
Draw a labeled diagrams wherever necessary. Each question carries 10 marks.

5 X 10M = 50M

SECTION – B

9. Explain the different organs of immune system
10. What is vaccine? Explain the different types of vaccines?
11. Write about tools and steps involved in genetic engineering
12. Write about applications of r-DNA technology in agricultural field
13. Describe in details about Omics

SECTION – C

14. Write about immunity and explain the types of immunity
15. Explain the different types of Ag-Ab reactions
16. Explain blotting techniques
17. What is transformation? Write about methods of transformation
18. Explain about protein BLAST method

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II B.Sc BIOTECHNOLOGY
FOURTH SEMESTER – PAPER - IV
PLANT AND ANIMAL BIOTECHNOLOGY

Aim and objectives of Course:

The objectives of this course are to introduce students to the principles, practices and application of animal biotechnology, plant tissue culture, plant and animal genomics, genetic transformation.

Learning outcomes of Course:

Students should be able to gain fundamental knowledge in animal and plant biotechnology and their applications

UNIT I

Plant tissue culture techniques & secondary metabolites production

Plant tissue culture: totipotency, media preparation – nutrients and plant hormones; sterilization techniques; establishment of cultures – callus culture, cell suspension culture, applications of tissue culture-micro propagation; Somatic embryogenesis; synthetic seed production; protoplast culture and somatic hybridization - applications. Cryopreservation,

UNIT II

Transgenesis and Molecular markers

Plant transformation technology-- Agrobacterium mediated Gene transfer (Ti plasmid), Transgenic plants as bioreactors. Herbicide resistance –glyphosphate, Insect resistance-Bt cotton, Molecular markers - RAPD, RFLP and DNA fingerprinting-principles and applications.

UNIT III

Animal tissue culture techniques

Animal cell culture: cell culture media and reagents; culture of mammalian cells, tissues and organs; primary culture, secondary culture, cell lines; Tests: cell viability and cytotoxicity, Cryopreservation. Transfection methods (calcium phosphate precipitation, electroporation, Microinjection) and applications.

UNIT IV

Transgenic animals & Gene Therapy

Production of vaccines, diagnostics, hormones and other recombinant DNA products in medicine (insulin,somatostatin, vaccines),IVF, Concept of Gene therapy, Concept of transgenic animals – Merits and demerits -Ethical issues in animal biotechnology.

UNIT V

Bioethics, Biosafety and IPR

Bioethics in cloning and stem cell research, Human and animal experimentation, animal rights/welfare. Bio safety-introduction to biological safety cabinets; primary containment for biohazards; biosafety levels; Introduction to IP-Types of IP: patents, trademarks & copyright.

Additional Inputs

- Phytohormones

BLUE PRINT

	ESSAY QUESTIONS	SHORT ANSWER QUESTIONS
UNIT -I	2	2
UNIT -II	2	1
UNIT -III	2	2
UNIT -IV	2	2
UNIT -V	2	1

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II B.Sc BIOTECHNOLOGY
FOURTH SEMESTER – PAPER - IV
PLANT AND ANIMAL BIOTECHNOLOGY

Time: 3 Hrs **Max Marks: 75M**

SECTION – A

Answer any 5 questions. Each question carries 5 marks. **5 X 5M = 25M**

1. Micro propagation
2. Cryopreservation
3. RAPD
4. Ti-Plasmid
5. Somatic embryogenesis
6. Cell lines
7. IVF
8. Animal rights

Answer any FIVE of the following questions atleast TWO form each section B & C
Draw a labeled diagrams wherever necessary each question carries 10 marks.

5 X 10M = 50M

SECTION – B

9. What are metabolites and explain different plant secondary metabolites
10. Explain the herbicide and insecticide resistance in transgenesis process
11. What are cell cultures and explain different types of cell cultures
12. Write a note on transgenic animals with merits and demerits
13. Explain about human and animal experimentation

SECTION – C

14. Explain different types of cultures.
15. What are transgenic plants? Write a note on transgenic plants as bioreactors
16. What is transfection and explain different methods of transfection
17. Write about recombinant DNA products in medicine
18. Explain about biosafety and different levels in biosafety.

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II B.Sc; BIOTECHNOLOGY

FOURTH SEMESTER – PAPER - V

ENVIRONMENTAL & INDUSTRIAL BIOTECHNOLOGY

Aim and objectives of Course:

This course aims to introduce fundamentals of Environmental Biotechnology. The course will also give an insight in introducing major groups of microorganisms and their industrial applications.

Learning outcomes of Course:

Students should be able to gain fundamental knowledge in animal and plant biotechnology and their applications.

UNIT I

Pollution Types and Control

Environmental Biotechnology-Environmental Pollution: Types of pollution, Biofilters, Bioscrubbers, Biotrickling filter. Water pollution and its management: Measurement of water, pollution, sources of water pollution. Microbiology of waste water treatment, aerobic processes, activated sludge, oxidation ponds, trickling filters, and rotating biological contactors. Anaerobic processes: Anaerobic digesters, upward flow anaerobic sludge blanket reactors.

UNIT II

Bioremediation

Biodegradation and Bioremediation – Concepts & principles of Bioremediation, Bioremediation of Hydrocarbons and its applications Degradation of pesticides and other toxic chemicals by microorganism. Role of genetically Engineered microbes, Concept of Phytoremediation, environmental safety guidelines.

UNIT III

Biofuels

Biofuels-biogas, microbial groups involved in biogas production & interactions, factors affecting biogas production, Biofertilizers, Vermiculture.

UNIT IV

Basic principles of Microbial technology

Industrially important microbes, its screening, selection and identification. Maintenance and preservation of industrially important microbial cultures. Strain Improvement, Basic concepts of fermentation; Design of Fermenter and applications.

UNIT V

Commercial Production of Microbial products: Microbial technology products and applications; Microbial production of Organic acids (Lactic acid), Amino acids (Glutamicacid). Fermentation by microbes for food additives: dairy products (Cheese), beverages (Beer) and antibiotics (Streptomycin, Pencillin)

Additional inputs

- Down steam processing
- Food additives

BLUE PRINT

	ESSAY QUESTIONS	SHORTS ANSWER QUESTIONS
UNIT -I	2	2
UNIT -II	2	2
UNIT -III	2	1
UNIT -IV	2	1
UNIT -V	2	2

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II B.Sc BIOTECHNOLOGY
FOURTH SEMESTER – PAPER - V
ENVIRONMENTAL & INDUSTRIAL BIOTECHNOLOGY

Time: 3 Hrs **Max Marks: 75M**

SECTION – A

Answer any 5 questions. Each question carries 5 marks. **5 X 5M = 25M**

1. Air pollution
2. Oxidation ponds
3. Hydro carbons applications
4. Phytoremediation
5. Biofertilizers
6. Vermiculture
7. Fermenter applications
8. Streptomycin

Answer any FIVE of the following questions atleast TWO form each section B & C
Draw a labeled diagrams wherever necessary. Each question carries 10 marks.

5 X 10M = 50M

SECTION – B

9. Explain the microbiology of waste water treatment
10. Explain biodegradation and bioremediation processes
11. Write about biogas production
12. Explain about preservation of industrial microbial cultures
13. Explain about microbial production of organic acids

SECTION – C

14. Explain about Biofertilizers and their application
15 Write about role of genetically engineered microbes
16. Write about factors affecting biogas production
17. Explain design and process of fermentation with an example
18. What are food additives and explain the process of fermentation for food additives.

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III B.Sc; BIOTECHNOLOGY

FIFTH SEMESTER – – PAPER III (A)

GENETICS AND MOLECULAR BIOLOGY

UNIT I

Mendel's Laws and Inheritance: Mendel experiments, Mendel Laws and deviations: incomplete dominance and Co dominance Penetration and pleiotropism, Recessive and Dominant epistatic gene interactions. Concept of multiple alleles

UNIT II

Genes and their variations: Structure of gene, gene and environment, gene copies and heterogeneity. Non disjunction of chromosomes, linkages, recombination, test cross and back cross, interference and coincidence, sex determination, Hardy Weinberg equations.

Unit III

Genome Structure: Watson and Crick model of DNA; Genome size. Concepts of Genetic Material, Gene, Chromosome and Genome. Experiments to prove DNA as genetic material (Griffith experiment, Hershey- Chase experiment)

Unit IV

DNA Replication:Enzymology of replication (DNA polymerase I, pol II and III, helicases, topoisomerases, single strand binding proteins, DNA melting proteins, primase. Proof of semi conservative replication, Replication origins, initiation, elongation, and termination. Rolling circle replication of DNA.

Unit V

Transcription: Enzymatic synthesis of RNA: Basic features of transcription, structure of prokaryotic RNA polymerase (core enzyme and holo enzyme, sigma factor), concept of promoter (Pribnow box, -10 and -35 sequences), four steps of transcription (promoter binding and activation, RNA chain initiation, chain elongation, termination and release). Reverse transcription.

BLUE PRINT

	ESSAY QUESTIONS	SHORTS ANSWER QUESTIONS
UNIT -I	2	2
UNIT -II	2	2
UNIT -III	2	1
UNIT -IV	2	1
UNIT -V	2	2

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II B.Sc BIOTECHNOLOGY

FIFTH SEMESTER – PAPER - III (A)

Genetics and Molecular Biology

Time: 3 Hrs **Max Marks: 75M**

Section – A

I. Answer any FIVE of the following questions. **5 X 5 = 25 M**

1. Test cross and back cross
2. Co-dominance
3. Law of purity of gametes
4. Hardy Weinberg equations
5. Chromosomes
6. Topoismoerases
7. Replication origin
8. Reverse transcription

II. answer any FIVE questions choosing atleast TWO from each section B and C
5 X 10 = 50M

Section – B

9. Describe Mendel's laws of inheritance
10. What are linkages? Explain the types of linkages
11. Describe the Hershey – Chase Experiment
12. Explain the Enzymology of replication
13. Describe Enzymes involved in transcription and process of transcription

Section – C

14. Describe Recessive and Dominant epistatic gene interaction.
15. Explain sex determination with examples
16. Write an essay on Watson and crick model of DNA
17. Describe process of replication. Proof of semi conservative method of replication
18. Describe the concept of Promoter

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III B.Sc; BIOTECHNOLOGY

FIFTH SEMESTER – – PAPER IV (A)

GENE EXPRESSION AND rDNA TECHNOLOGY

UNIT I

Genetic Code

Genetic code: codon and its characteristics, identification of start and stop codons, universality, degeneracy and commaless nature of codons. The decoding system: aminoacyl synthetases.the adaptor hypothesis, attachment of amino acids to Trna Codon – anticodon interaction – the wobble hypothesis. Selection of initiation codon – Shine and Dalgarno sequence

UNIT II

Protein Synthesis

Initiation, elongation, termination and post translational modification. Regulation of translation: phage T4 protein p32 translational regulation

UNIT III

Gene Expression and regulation

Regulation of gene expression: clustered genes and the operon concepts – negative and positive control of the lac operon, trp operon, and control of gene expression.

UNIT IV

rDNA Technology

DNA Cloning: Basics of genetic engineering, restriction endonulceases Vectors: plasmid vectors (pBR322 and pUC18)Phage vector: lambda replacement and insertion Vectors cosmids.phagemids and YACCutting and joining DNA (Cohesive end ligation, methods of blunt end ligation)Blotting techniques: Southern and Northern blotting

UNIT V

Genomic DNA library and cDNA library

Construction of genomic and cDNA libraries. Advantages and disadvantages of genomic and cDNA libraries. General consideration of Polymerase chain reaction, desgining of primers for PCR. Application of recombinant DNA technology.

Blue Print

Unit no	Essay Questions	Short Answer Questions
I	2	2
II	2	2
III	2	1
IV	2	1
V	2	2

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II B.Sc BIOTECHNOLOGY

FIFTH SEMESTER – PAPER - IV (A)

GENE EXPRESSION AND rDNA TECHNOLOGY

Time: 3 Hrs **Max Marks: 75M**

Section – A

I. Answer any FIVE of the following questions. **5 X 5 = 25 M**

1. Characteristics of Codon
2. Wobble hypothesis
3. Initiation
4. YAC
5. Blunt ends
6. Vector
7. Genome
8. Primers

Section – B

II. answer any FIVE questions choosing atleast TWO from each section B and C

5 X 10 = 50M

9. What is genetic code? Explain it.
10. Describe the Post translational modifications.
11. Describe the Lac Operon concept.
12. What is Blotting? Explain the Southern Blotting.
13. Explain the polymerase chain reaction.

Section – C

14. Describe the Codon and Anticodon interaction and selection of Initiation codon
15. Describe the regulation of translation.
16. Describe the Eukaryotic gene regulation
17. Describe the different types of Cloning Vectors
18. What are the application of recombinant DNA technology

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III B.Sc; BIOTECHNOLOGY

SIXTH SEMESTER – PAPER - VII

ECOLOGY

UNIT I

The Environment: Physical environment;biotic environment; biotic and abiotic interactions. Habitat and Niche: Concept of habitat and niche; niche width and overlap; fundamental and realized niche; resource partitioning; character displacement.

UNIT II

Population Ecology: Characteristics of a population; population growth curves; population regulation;

UNIT III

Community Ecology: Nature of communities; community structure and attributes; levels of species diversity and its measurement; edges and ecotones.Ecological Succession: Types; mechanisms; changes involved in succession; concept of climax.

UNIT IV

Species Interactions: Types of interactions, interspecific competition, herbivory, carnivory, pollination, symbiosis.

UNIT V

Ecosystem Ecology: Ecosystem structure; ecosystem function; energy flow and mineral cycling (C,N,P); primary production and decomposition; structure and function of some Indian ecosystems: terrestrial (forest, grassland) and aquatic (fresh water, marine, eustarine).

BLUE PRINT

	ESSAY QUESTIONS	SHORTS ANSWER QUESTIONS
UNIT -I	2	2
UNIT -II	2	1
UNIT -III	2	2
UNIT -IV	2	1
UNIT -V	2	2

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APPROVED

6/7/19

T. Ramesh 6/7/19

B. Nageshwari 6/7/19

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III B.Sc BIOTECHNOLOGY

SIXTH SEMESTER – PAPER- VII

ECOLOGY

Time: 3 Hrs **Max Marks: 75M**

SECTION – A

Answer any 5 questions. Each question carries 5 marks. **5 X 5M = 25M**

1. Ecological Succession and Niche
2. Population growth curves
3. Edges and Ecotones
4. Symbiosis
5. Components of Ecosystem
6. Abiotic interaction
7. Definitions and examples of individual , population, community and habitat
8. Upright energy flow and inverted energy flow in eco system with examples

Answer any FIVE of the following questions atleast TWO form each section B & C
Draw a labeled diagrams wherever necessary. Each question carries 10 marks.

5 X 10M = 50M

SECTION – B

9. Describe Abiotic and biotic Compenents of Environment and their interaction with plants
10. Describe Population and Characterstics of population
11. Describe Structure and attributes of community
12. Describe different types of species interactions and their effects
13. Describe different types of energy flow and Carbon cycling

SECTION – C

14. Describe Niche and different types of Niche
15. Describe Population curve and its regulation
16. Describe succession mechanism and types
17. Describe Symbiosis and types of symbiotic relations with examples
18. . Describe different types of ecosystems with energy flow and examples

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III B.Sc; BIOTECHNOLOGY

SIXTH SEMESTER – PAPER – VIII CE-I

DIVERSITY IN LIFE

UNIT I

Principles & methods of taxonomy: Concepts of species and hierarchical taxa, biological nomenclature, classical &quantititative methods of taxonomy of plants, animals and microorganisms.

UNIT II

Levels of structural organization:Unicellular, colonial and multicellular forms. Levels of organization of tissues,organs & systems. Comparative anatomy, adaptive radiation, adaptive modifications.

UNIT III

Natural history of Indian subcontinent: Major habitat types of the subcontinent, geographic origins and migrations of species.

UNIT IV

Organisms of health & agricultural importance: Common parasites and pathogens of humans, domestic animals and crops.

UNIT V

Organisms of conservation concern: Rare, endangered species. Conservation strategies.

BLUE PRINT

	ESSAY QUESTIONS	SHORTS ANSWER QUESTIONS
UNIT -I	2	2
UNIT -II	2	1
UNIT -III	2	2
UNIT -IV	2	1
UNIT -V	2	2

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III B.Sc BIOTECHNOLOGY

SIXTH SEMESTER – PAPER- VIII CE.-I

DIVERSITY IN LIFE

Time: 3 Hrs **Max Marks: 75M**

SECTION – A

Answer any 5 questions. Each question carries 5 marks. **5 X 5M = 25M**

1. Hierarchial taxa
2. Adaptive radiation
3. Circadian rythms
4. Continental drift and gene pool
5. Two types symbiotic relation between plants and microbes with mechanism
6. Endangered, Rare and Extinct Species with example
7. Principles of taxonomy
8. Totipotency aneuploidy and polyploidy with examples

Answer any FIVE of the following questions atleast TWO form each section B & C
Draw a labeled diagrams wherever necessary. Each question carries 10 marks.

5 X 10M = 50M

SECTION – B

9. Describe principles and methods of taxonomy
10. Describe multicellular forms of life
11. Describe circadian ryhtms behind migration of species with two elaborate examples
12. Describe importance of organisms in health and agriculture
13. Describe strategies for conservation of endangered species

SECTION – C

14. Describe classical and quantitative methods of taxonomy in microbes
15 Describe comparative taxonomy with examples
16. Describe habitat and distribution of population in habitat
17. Describe common pathogens parasites of human and domestic animals with two elaborate examples
18. Describe different levels representing status of life forms with example

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III B.Sc; BIOTECHNOLOGY

SIXTH SEMESTER – PAPER – VIII CE-II

EVOLUTION

UNIT I

Emergence of evolutionary thoughtsLamarck; Darwin–concepts of variation, adaptation, struggle, fitness and natural selection; Mendelism; Spontaneity of mutations; The evolutionary synthesis.

UNIT II

Origin of cells and unicellular evolution:Origin of basic biological molecules; Concept of Oparin and Haldane; Experiement of Miller (1953); The first cell; Evolution of prokaryotes; Origin of eukaryotic cells; Evolution of unicellular eukaryotes; Anaerobic metabolism, photosynthesis and aerobic metabolism.

UNIT III

Molecular Evolution:Concepts of neutral evolution, molecular divergence and molecular clocks; Molecular tools in phylogeny, classification and identification

UNIT IV

The Mechanism:Population genetics- Populations, Gene pool, Gene frequency; Hardy-Weinberg Law; concepts and rate of change in gene frequency through natural selection, migration and random genetic drift

UNIT V

Adaptive radiation; Isolating mechanisms; Speciation; Allopatricity and Sympatricity; Convergent evolution; Sexual selection; Co-evolution.

BLUE PRINT

	ESSAY QUESTIONS	SHORTS ANSWER QUESTIONS
UNIT -I	2	2
UNIT -II	2	1
UNIT -III	2	2
UNIT -IV	2	1
UNIT -V	2	2

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III B.Sc BIOTECHNOLOGY

SIXTH SEMESTER – PAPER- VIII CE-II

EVOLUTION

Time: 3 Hrs **Max Marks: 75M**

SECTION – A

Answer any 5 questions. Each question carries 5 marks. **5 X 5M = 25M**

1. Darwins concept of evolution
2. Putrefaction
3. Neutral evolution
4. Hardy – Weinberg law
5. Allopatricity and sympatricity
6. UPGMA
7. Gene frequency and allelic frequency with example
8. Graphical representation of r-selection and k-selection

Answer any FIVE of the following questions atleast TWO form each section B & C
Draw a labeled diagrams wherever necessary. Each question carries 10 marks.

5 X 10M = 50M

SECTION – B

9. Describe Mendelian principles of Evolution
10. Describe Anaerobic metabolism in prokaryotes
11. Describe molecular divergence and molecular clocks with mechanism
12 Describe concepts and rate of change in gene frequency through natural selection
13. Describe Speciation and types of speciation

SECTION – C

14. Describe Spontaneity of mutation and natural mutation with examples
15. Describe concept of Operin and Haldane concept of Evolution with Muller's experiment
16. Describe molecular phylogeny and different types of phylogeny concepts
17. Describe Hardy – Weinberg law with elaboration of equation
18. Describe r –selection and k- selection

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II B.Sc; BIOTECHNOLOGY

SIXTH SEMESTER – PAPER - VIII CE-III

PROJECT

Lab Time: 3 hours Max Marks: 100M

Thesis Submission (Quality of work) – 25M

Result – 25 M

Power point presentation – 25 M

Viva – 25 M

Should submit Thesis copy and power point presentation handouts hard copy to the Examiner.