

Choice based Credit System (CBCS)
For
B.Sc., (Biotechnology)
(Undergraduate Programme)
(Effective from the Academic Year 2017-18)



Department of Biotechnology
Sri Y.N.College (Autonomous)
Narsapur, Andhra Pradesh

DETAILS OF PAPER TITLES & CREDITS

Sem	Course no.	Course Name	Course type (T/L/P)	Hrs./ Week: Science:4+2	Credits : Science:4+1	Max. Marks Cont/Internal/Mid Assessment	Max.Marks Sem-end Exam
I	1	Microbiology and cell biology	T	4	4	25	75
		Microbiology and cell biology lab	L	2	1	-	50
II	2	Microbiology and cell biology	T	4	4	25	75
		Microbiology and cell biology lab	L	2	1	-	50
III	3	Biophysical techniques	T	4	4	25	75
		Biophysical techniques lab	L	2	1	-	50
IV	4	Immunology	T	4	4	25	75
		Immunology Lab	L	2	1	-	50
	5	Genetics and Molecular Biology	T	3	4	25	75
		Genetics and Molecular Biology Lab	L	2	1	-	50
V		Gene expression and r-DNA Technology	T	3	1	25	75
		Gene expression and r-DNA Technology	L	2	1		50

Note: *Course type code: T: Theory, L: Lab, P: Problem solving

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 IV

Microbial growth and control: Growth: Growth rate and generation time, details of growth curve and its various phases. Concept of synchronous cultures, continuous and batch cultures (chemostat and turbidostat). Measurement of growth. Physical conditions required for growth: Temperature (classification of microorganisms on the basis of temperature requirements), pH etc. Pure cultures and cultural characteristics. Maintenance of pure culture. Microbial Control: Terminologies - Sterilization, disinfection, antiseptic, sanitization, germicide, microbistasis, preservative and antimicrobial agents..Physical control: Temperature (moist heat, autoclave, dry heat, hot air oven and incinerators), dessication, surface tension, osmotic pressure, radiation, UV light, electricity, ultrasonic sound waves, filtration.

UNIT-V

Cell Biology: Eukaryotic Cell - Structure and function of the following: nucleus, nuclear membrane, nucleoplasm, nucleolus, golgi complex, Mitochondria, Chloroplast, endoplasmic reticulum, lysosomes, peroxisomes, glyoxisomes and vacuoles.

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

K. J. Reddy

T. Ramani
11/7/2017

P. Chennakeswari
1/7/17



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I B.Sc BIOTECHNOLOGY
FIRST SEMESTER - PAPER I (A)
CELL BIOLOGY AND MICROBIOLOGY

Time: 3Hrs

Max. Marks: 75

SECTION – A

I. Answer Any **FIVE** of the following Questions.

5 x 5 = 25

1. Louis Pasteur
2. Gram positive bacteria
3. Difference between virus and typical microbial cells
4. Natural and synthetic media
5. Ultrasonic sound waves
6. Antimicrobial gent
7. Nucleus
8. Vacuoles

SECTION – B

II. Answer any five questions choosing atleast **TWO** from each section B and C

5 X 10 = 50M

9. Define microscope and explain the compound microscope with diagrams
10. Explain the general characteristics of Viruses
11. Write in detail the basic nutritional requirements
12. What is Sterilization and explain it
13. Describe the mitochondria, chloroplast, endoplasmic reticulum with diagrams

SECTION – C

14. Write an essay on TEM and SEM
15. Describe the general morphology of bacteria
16. Explain the nutritional classification of bacteria
17. Detail account on growth curve and its various phases
18. Define cell and explain the structure of Eukaryotic cell

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P. chennakeswari
01/7/2017

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T. Ramesh

11/7/2017

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I B.Sc BIOTECHNOLOGY
SECOND SEMESTER - PAPER I (B)
MACROMOLECULES, ENZYMOLOGY AND BIOENERGETICS

UNIT I

Nucleic Acids and Chromosomes

Chemical structure and base composition of nucleic acids, Chargaff's rules, Watson Crick Model (B-DNA), other forms of DNA (A and Z-DNA). Maxam and Gilbert DNA sequencing and Sanger's method.

Concept of prokaryotic genes and eukaryotic genes: Definition of a gene, concept of split genes, introns, exons, spacers, C-value and C-value paradox.

Chromatin structure: Nucleosome, types of histones, arrangement of histones in the octamer, H1 histone and its role, role and length of linker DNA, 300 nm fibers (arrangement of nucleosome in a helical structure), domain and loop structure. Role of telomere and centromere, telomeric and centromeric repeat sequences.

UNIT II

Amino acids and Proteins

Amino acids: Structure of amino acids occurring in proteins, classification of amino acids (pH based, polarity based and nutrition based), Physico-chemical properties of amino acids (solubility, boiling and melting points, reactions like Edman's, Sanger's, Dansyl chloride, ninhydrin).

Primary structure of proteins: Determination of primary structure (end group analysis, cleavage of disulfide bonds, amino acid composition, use of endopeptidase specificity, sequence determination, assignment of disulfide position).

Secondary structure of proteins: The α -helix, β -structures (parallel, antiparallel).

Tertiary structure of proteins: Forces that β stabilize the structure (electrostatic forces, hydrogen and disulfide bonds, hydrophobic associations), myoglobin as an example of tertiary structure, concept of domains, protein denaturation.

Quaternary structure of proteins: Forces stabilizing quaternary structure.

UNIT III:

Carbohydrates

Definition, classification, nomenclature of carbohydrates, structures of monosaccharides, disaccharides and polysaccharides (structures of starch and glycogen as examples of homopolysaccharides) and examples of heteropolysaccharides.

Lipids

Types of lipids, structures of saturated and unsaturated fatty acids, triglycerides, phospholipids, plasmalogens, gangliosides and sphingolipids. Terpenoids and isoprenoids - definition and representative structures, steroids. Chemistry of Porphyrines, Heme, Cytochromes, and Chlorophylls

UNIT IV

Enzymes

Terminology: Active site, allosteric site, Holoenzyme, apoenzyme, coenzyme, substrate, inhibitor, activator, modulator etc. Classification and nomenclature. Concept of isoenzymes (example Lactate Dehydrogenase) and multienzymes (example pyruvate dehydrogenase) Substrate Specificity (bond specificity, group specificity, absolute specificity, stereo-specificity, proof-reading mechanism), lock and key and induced fit models.

Assay of Enzymes: Concept of activity, specific activity, turnover number, units of enzyme activity (katal, international unit),

Enzyme kinetics: Michaelis-Menten equation, effect of substrate concentration, effect of enzyme concentration, effect of pH and temperature, temperature quotient, enzyme inhibition kinetics

(reversible inhibition types – competitive, uncompetitive and non-competitive)

UNIT V

Bioenergetics: Concept of free energy, Entropy, Enthalpy & Redox Potential. Concept of high energy bonds as related to the structure of ATP, Phosphoenolpyruvate etc. Glycolysis (pathway, entry of other monosachharides and disaccharides, regulation, inhibitors) Gluconeogenesis: Bypass reactions.

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Unit no	Essay Questions	Short Answer Questions
I	2	2
II	2	2
III	2	0
IV	2	2
V	2	2

K. L. S.

T. Ramani
1/7/2017

P. Chennakeswari
1/7/17

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II B.Sc BIOTECHNOLOGY
THIRD SEMESTER - PAPER II (A)
BIOPHYSICAL TECHNIQUES

UNIT - I

Spectrophotometry: Spectrum of light, absorption of electromagnetic radiations, Beer's law - derivation and deviations, extinction coefficient. Instrumentation of UV and visible spectrophotometry, Double beam spectrometer; dual-wavelength spectrometer, Applications of UV and visible spectrophotometry.

UNIT II

Chromatography: Partition principle, partition coefficient, nature of partition forces, brief account of paper chromatography. Thin layer chromatography and column chromatography. Gel filtration: Concept of distribution coefficient, types of gels and glass beads, applications. Ion-exchange chromatography: Principle. Affinity chromatography: Principle, selection of ligand, specific and non-specific elution, applications. HPLC

UNIT III

Electrophoresis: Migration of ions in electric field, Factors affecting electrophoretic mobility. Paper electrophoresis, Gel electrophoresis: - Types of gels, Solubilizers, Procedure, Column & slab gels Detection, Recovery & Estimation of macromolecules. SDS-PAGE Electrophoresis and applications. Isoelectric focusing.

UNIT - IV

Isotopic tracer technique: Radioactive & stable isotopes, rate of radioactive decay. Units of radioactivity.. Measurement of Stable isotopes: Falling drop method for deuterium measurement, Mass spectrometry. Principles of tracer technique, advantages and limitations, applications of isotopes in biotechnology (distribution studies, metabolic studies, isotope dilution technique, metabolic studies, clinical applications, autoradiography).

UNIT V

Centrifugation: Basic principles, concept of RCF, types of centrifuges (clinical, high speed and ultracentrifuges). Preparative centrifugation: Differential and density gradient centrifugation, applications (Isolation of cell components). Analytical centrifugation: Sedimentation coefficient, determination of molecular weight by sedimentation velocity and sedimentation equilibrium methods.

Biostatistics Basic concepts of mean, median, mode, Standard deviation and Standard error. Introduction to ANOVA

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

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T. Ramani
1/7/2017

P. Channakeswari
1/7/17



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II B.Sc BIOTECHNOLOGY
THIRD SEMESTER - PAPER II (A)
BIOPHYSICAL TECHNIQUES

Time: 3Hrs

Max. Marks: 75

SECTION – A

I. Answer Any **FIVE** of the following Questions.

5 x 5 = 25

1. Beer Lambert's law
2. Partition coefficient
3. Gel filtration
4. Isoelectric focusing
5. Isotopes
6. Autoradiography
7. Sedimentation coefficient
8. Standard error

SECTION – B

II. Answer any five questions choosing atleast **TWO** from each section B and C

5 X 10 = 50M

9. Describe in detail about the spectrophotometry
10. Explain the Paper chromatography
11. Describe the SDS PAGE
12. Write the application of Isotopes in Biotechnology
13. What is Centrifugation and types of Centrifugation

SECTION – C

14. Explain the applications the UV and visible Spectrophotometry
15. Write in detail about HPLC
16. Describe the Gel electrophoresis with neat labeled diagrams
17. Write the principle and application of Mass Spectrophotometry
18. Write a brief note on mean, mode, standard deviation and ANOVA

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p.chennakeswari
01/07/2017

K. J. P. S.
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T. Ramesh

11/7/2017

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II B.Sc BIOTECHNOLOGY

FOURTH SEMESTER - PAPER II (B)

IMMUNOLOGY

UNIT I

Immune system: Organs and cells of immune system Immunity, innate immune mechanism, Acquired immune mechanism, Antigen, Humoral immunity, main pathways of complement system.

UNIT II

Antibody and Antigen: Antibody structure and classes, Antibody diversity, Types of Antigens Antigenicity (factors affecting antigenicity). Complement system .

UNIT III

Immunity: Cell mediated immunity: TC mediated immunity, NK cell mediated immunity, ADCC, brief description of cytokines and MHC (MHC types and diversity)

UNIT IV

Hypersensitivity and vaccination: General features of hypersensitivity, various types of hypersensitivity, Vaccination: Discovery, principles, significance, Types of Vaccines

UNIT V

Immunological Techniques: Antigen-antibody reactions: Precipitation, agglutination, complement fixation, immunodiffusion, ELISA. Hybridoma technology: Monoclonal antibodies and their applications in immunodiagnosis.

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

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II B.Sc BIOTECHNOLOGY
FOURTH SEMESTER - PAPER II (B)
IMMUNOLOGY

Time: 3Hrs

Max. Marks: 75

SECTION - A

I. Answer Any **FIVE** of the following Questions.

5 x 5 = 25

1. Antigen
2. Antigenecity
3. Complement system
4. Cytokines
5. Immunity
6. Vaccination
7. Louis Pasteur
8. Agglutination

SECTION - B

II. Answer any five questions choosing atleast **TWO** from each section B and C

5 X 10 = 50M

9. Describe in detail about the cells of the immune system
10. Explain the antigen and antibody with structure
11. Describe the MHC
12. Write an essay on ELISA
13. Explain the Hypersensitivity

SECTION - C

14. Explain the organ of the immune system
15. Write in detail about factors affecting antigenecity
16. Describe the cell mediated immunity.
17. Write essay on vaccination
18. Write a brief note monoclonal antibodies

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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

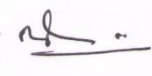
DNA Replication: Enzymology of replication (DNA polymerase I, pol II and III, helicases, topoisomerases, single strand binding proteins, DNA melting proteins, primase. Proof of semi conservative replication, Replication origins, initiation, elongation, and termination. Rolling circle replication of DNA.

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.

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

K. S. 

T. Ramani
1/7/2017

P. chennakeswari
1/7/2017





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Batch: 2017-18
SRI Y.N.COLLEGE (AUTONOMOUS), NARSAPUR
(Affiliated to Adikavi Nannayya University)

III B.Sc., Degree Examinations
(At the end of Vth Semester)

Part – II

BIOTECHNOLOGY Paper – III (A)
(Genetics and Molecular Biology)

Duration: 3Hrs

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. Topoisomerases
7. Replication origin
8. Reverse transcription

Section – B

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

5 X 10 = 50M

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

P. Chennakeswari
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T. Ramani

11/7/2017



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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 endonucleases

Vectors: plasmid vectors (pBR322 and pUC18)

Phage vector: lambda replacement and insertion

Vectors cosmids, phagemids and YAC

Cutting 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, designing of primers for PCR. Application of recombinant DNA technology.

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Unit no	Essay Questions	Short Answer Questions
I	2	2
II	2	1
III	2	0
IV	2	3
V	2	2

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1/7/2017

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01/7/2017.

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Structure and Syllabus under CBCS

III YEAR	* Any one Paper from VII A, B and C	VII (A)*	Developmental Biology	100	03
			Practical - VII A	50	02
		VII (B)*	Ecology	100	03
			Practical - VII B	50	02
		VII (C)*	Biostatistics, bioinformatics and IPRS	100	03
			Practical - VII C	50	02
	** Any one cluster from VIII, A, B and C	VIII (A)**	Cluster Electives - I :		
			VIII-A-1: Plant Physiology	100	03
			VIII-A-2: Animal Physiology	100	03
			VIII-A-3: Inheritance Biology	100	03
			Practical VIII A-I	50	02
			Practical VIII A-2	50	02
			Practical VIII A-3	50	02
		VIII (B)**	Cluster Electives - II ::		
			VIII-B-1: Diversity in Life	100	03
			VIII- B-2 :Evolution	100	03
			VIII-B-3 :Project	100	03
			Practical VIII B-I	50	02
			Practical VIII B-2	50	02
			Viva-Voce VIII B-3	50	02
		VIII (C)**	Cluster Electives - III ::		
			VIII-C-1: Plant Biotechnology and Animal Biotechnology	100	03
			VIII-C-2 :Environmental Biotechnology	100	03
			VIII-C-3 :Industrial Biotechnology	100	03
			Practical VIII C-I	50	02
			Practical VIII C-2	50	02
			Practical VIII C-3	50	02

***Candidate has to choose only one paper**

**** Candidates are advised to choose Cluster (A) if they have chosen VII (A) and Choose Cluster (B) if they have chosen VII (B) etc. However, it is suggestive.**

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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).

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	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- 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 Components of Environment and their interaction with plants
10. Describe Population and Characteristics 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 – PRACTICAL PAPER- VII
ECOLOGY

List of Practical's

1. To determine basal cover of trees in a forest ecosystem/forest plantation.
2. Quantitative analysis of soil organic carbon.
3. Quantitative analysis of soil pH.
4. To study pore space, water holding capacity and bulk density of soil.
5. Identification of rocks and minerals on the basis of physical characters.



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III B.Sc BIOTECHNOLOGY

SIXTH SEMESTER - PAPER- VIII CE-I

PLANT AND ANIMAL BIOTECHNOLOGY

UNIT- I

Cell and tissue culture: Introduction to cell and Tissue culture Laboratory facilities, Explant. Tissue culture media (composition and preparation) Callus and suspension cultures: initiation and maintenance of callus and suspension cultures; single cell clones.

UNIT- II

Tissue and micropropagation: Direct and indirect regeneration, production of haploids, protoplast culture and Somatic hybridization.

UNIT- III

Cloning in plants -Ti plasmid organization. Concept of transgenic plants Bt-cotton and other plant applications.

UNI- IV


Various techniques of animal cell and tissue culture: Culture media, growth factors, laboratory facilities for animal cell culture. Characteristics of cells in culture: Contact inhibition, anchorage dependence, cell-cell communication etc.; Cell senescence; cell and tissue response to trophic factors. Primary culture, immortal cells, cell lines. Maintenance of cell lines in the laboratory.

UNIT-V

r-DNA products: Brief idea about recombinant DNA products in medicine (insulin, somatostatin, vaccines), Concept of Gene therapy, Production of recombinant vaccines–hepatitis. Concept of transgenic animal's In-vitro fertilization and embryo transfer in humans and farm animals.

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	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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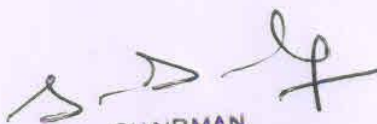
III B.Sc BIOTECHNOLOGY
SIXTH SEMESTER - PAPER- VIII CE-I
PLANT AND ANIMAL BIOTECHNOLOGY

PRACTICALS

- 1.Establishing a plant cell culture (both in solid and liquid media)–seed germination, callus culture, suspension cell culture, regeneration from callus cells.
 2. Suspension culture.
 - 3.Cell count by hemocytometer.
 - 4.Cytology of callus.
 - 5.Establishing primary cell culture of chicken embryo fibroblasts.
 - 6.Animal tissue culture –maintenance of established cell lines.
 - 7.Animal tissue culture –virus cultivation.
 - 8.Measurement of cell size.
 9. Microphotography.
 - 10.IMViC test.
 - 11.Determination of seed viability.
- Note: perform any 8 practicals

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III B.Sc BIOTECHNOLOGY
SIXTH SEMESTER - PAPER- VIII CE-III
INDUSTRIAL BIOTECHNOLOGY

Unit - I

Isolation, Screening, Preservation and Improvement of Industrially Important Microorganisms. Synthetic and Natural Medium, Precursors, Antifoams, Sterilization Methods and Inoculum Preparation.

Unit- II

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

Unit- III

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

Unit- IV


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

Unit-V

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

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-III

INDUSTRIAL BIOTECHNOLOGY

PRACTICALS

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

Note: perform any 6 practicals

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T. Ramesh

R. Chandra Kumar

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III B.Sc BIOTECHNOLOGY
SIXTH SEMESTER - PAPER- VIII CE-II
ENVIRONMENTAL BIOTECHNOLOGY

Unit-I

Principles of Ecology: Water and terrestrial ecosystems, Bio-geo chemical cycles - Carbon, Nitrogen cycles. Role of microbes in bio-geochemical cycles.

Unit - II

Inorganic and Organic pollutants of air, land and water; maintenance of standards, Environmental monitoring. Detection, treatment and prevention of pollution. Biological indicators

Unit - III

Biocides, Four stage alternatives, Refuse disposal - Treatment methods, effluent from pharmaceuticals, fertilizers, pulp and paper industry.

Unit - IV


Waste water management - Aerobic and anaerobic treatment, primary, secondary and tertiary treatment of municipal wastes, Solid waste management.

Unit-V

Bioremediation, Biodegradation of recalcitrant compounds and the role of genetically engineered microbes and genetically modified organisms in the environmental management.

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
ENVIRONMENTAL BIOTECHNOLOGY

PRACTICALS

1. Detection of coliforms for determination of the purity of potable water.
 2. Determination of total dissolved solids of water
 3. Determination of Hardness and alkalinity of water sample.
 4. Determination of dissolved oxygen concentration of water sample
 5. Determination of biological oxygen demand of sewage sample
 6. Determination of chemical oxygen demand (COD) of sewage sample.
 7. Isolation of xenobiotic degrading bacteria by selective enrichment technique
 8. Estimation of heavy metals in water/soil
 9. Estimation of nitrate in drinking water.
 10. Preparation and formulation of microbial biopesticide (bacteria, fungi and viruses)
 11. In vitro evaluation of medicinal plants against pathogenic microbes.
 12. Effect of mycorrhizal fungi on growth promotion of plants.
 13. Production of microbial fertilizers (Rhizobium, Azotobacter and AMF).
- Note: perform any 8 practicals

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