PITHAPUR RAJAH'S GOVERNMENT COLLEGE

(AUTONOMOUS)

KAKINADA

XVIII–BOARD OF STUDIES

DEPARTMENT OF BIOTECHNOLOGY

2017-18

(CHOICE BASED CREDIT SYSTEM)

P.R.GOVT.COLLEGE (AUTONOMOUS) KAKINADA.
2017-18, XVIII BOARD OF STUDIES MEETING. Dt. 10.04.2017
DEPARTMENT OF BIOTECHNOLOGY

The members present have discussed the syllabi and model question papers (Theory and Practical) related to I to VI semesters in Biotechnology and made the following Resolutions.

Resolution I: Resolved to Continue CBCS System as instructed by Commissioner of Collegiate Education) CCE, Amaravathi.

Resolution II: Resolved to implement 60% external and 40% internal marks for both theory and practicals from the academic year 2017-18. **However, university nominee insisted on 75% external and 25% internal. As majority of BOS members agreed for 60% external and 40% internal, it was decided to implement 60% externals and 40% internals from the academic year 2017-18.**

Resolution III: Resolved to split 40 Marks of Theory internal as 20 Marks for mid exams and 20 marks for co-curricular activities (Seminar/Assignment/Quiz/Group Discussion).

Resolution IV: Resolved to conduct Practical examination also at the end of each semester for even I year students from the academic year 2017-18

Resolution V: Resolved to follow the same syllabus and exam pattern for the coming II and III year students.

Resolution VI: Resolved to continue two Subject Electives in Fifth Semester as Advanced Electives (Elective 1-Plant Biotechnology and Elective 2-Animal Biotechnology) and in Sixth Semester two Skill Based Electives (Elective 1-Industrial Biotechnology and Elective 2-Environmental Biotechnology).

Resolution VII: Resolved to continue the same paper setters and Examiners for all semesters.(List of Paper setters and Examiners is appended).

Resolution VIII: Resolved to include Blue Prints for model question papers for all semesters.

Chairperson
Board of Studies
Dept. of Biotechnology

P.R. GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
DEPARTMENT OF BIOTECHNOLOGY

XVIII-BOARD OF STUDIES MEETING 2017-18
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2014-15)

Time: 10.30 A.M. **Date: 10.04.2017**

Venue: *Department of Biotechnology*

The XVIII BOARD OF STUDIES Meeting of the Department of Biotechnology took place 10.30 A.M. on 10.04.2017 in the Department of Biotechnology P.R. Govt. College, (A) Kakinada for the year 2017-18. The following members attended.

Sl No	Name and Affiliation	Designation	Signature
01	Dr.B.Elia Lecturer in-charge Dept of Biotechnology P R College(Autonomous) KAKINADA.	Chairperson	
02	Dr.A.Matta Reddy Associate Professor in Zoology Dept. of Zoology Adikavi Nannaya University RAJAHMAHENDRAVARM	Vice-Chancellor's Nominee	
03	Dr.P.Nageswari Lecturer in Biotechnology Govt.Arts College RAJAHMAHENDRAVARM	Subject Expert	
04	Dr.A.Sreenivasulu Director V.S.Lakshmi Research Center	Subject Expert	
05	Dr.T.V.V.Satyanarayana Lecturer in Zoology IDEAL Degree College Kakinada	Senior Lecturer	

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DEPARTMENTAL STAFF

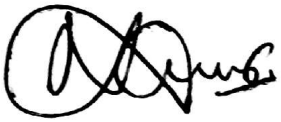
6.Dr.N.Sreenivas
Lecturer in Zoology
P.R.Govt College (A)
Kakinada.

Member

7. B.Ahmed Ali Baba
Lecturer in Zoology
P.R.Govt College (A)
Kakinada.

Member

8. Dr. M Naveen Babu
Lecturer in Zoology (Substitute teacher)
P.R.Govt.College (A)
Kakinada.



8. G.N.V.Satish
Guest Lecturer in Biotechnology
P.R.Govt College (A)
Kakinada.

Member

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P.R. GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
DEPARTMENT OF BIOTECHNOLOGY
XVII-BOARD OF STUDIES MEETING 2017-18
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2014-15)

S. No.	Semester No.	General Core/Elective/ Add-on	Title
1	I	General Core	Cell Biology & Genetics-I
2	II	General Core	Biomoloecules & Biostatastics-II
3	III	General Core	Enzymology & Intermediary Metabolism
4	IV	General Core	Microbiology & Bio-Physical Techniques
5	V	General Core	Molecular Biology
6	V	Advanced Elective-I	Plant Biotechnology
7	V	Advanced Elective-II	Animal Biotechnology
8	VI	General Core	Immunology & rDNA Technology
9	VI	Elective (Skill Based)	Industrial Biotechnology
10	VI	Elective (Skill Based)	Environmental Biotechnology
11	VI	Add-On Course	Biofertilizers

P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
BIOTECHNOLOGY SYLLABUS
(WITH EFFECTIVE FROM 2014-2015)
SEMESTER - I
CELL BIOLOGY & GENETICS

COURSE CODE – BT 1210 CG

Hrs : 4 **CREDITS-3**

INSTRUCTIONAL OBJECTIVES

1. To Impart Knowledge about Cell Structure functions of various cell organelles and their interrelationship.
2. To Impart Knowledge on Chromosome organization and cell cycle.
3. To Impart Knowledge on Mendel's Laws and Mechanism of Inheritance.

Cell Structure, Function and Cell Division

MODULE-I

1.1 Cells as basic units of living organisms
Viral, bacterial, fungal, plant and animal cells

1.2 Ultra structure of prokaryotic cell (Cell membrane, plasmids)

1.3 Ultra structure of eukaryotic cell (Cell wall, cell membrane, mitochondria, chloroplast, endoplasmic reticulum, Golgi apparatus, vacuoles).

MODULE-II

2.1 Chromosome organization in Prokaryotes and Eukaryotes

2.2 Structure of specialized chromosomes (Polytene and Lamp Brush)

2.3 Cell Division and Cell Cycle

2.4 Significance of mitosis and meiosis

Mendel's Laws and Mechanism of Inheritance

MODULE-III

3.1 Mendel's experiments – Factors contributing to success of Mendel's experiments

3.2 Law of segregation – Monohybrid ratio

3.3 Law of Independent assortment – Dihybrids, Trihybrids

3.4 Deviation from Mendel's Laws - partial or incomplete dominance, co-dominance

MODULE-IV

4.1 Penetrance and expressivity, pleiotropism

4.2 Epistatic gene interaction – Modified dihybrid ratios (12:3:1; 9:7; !5:1; 9:3:4:, 9:6:1; 13:3)

4.3 Genes and environment – phenocopies

MODULE-V

5.1 Linkage and recombination – Discovery of linkage, cytological proof of crossing over

Recombination frequency and map distance

Interference and coincidence

Mitotic crossing over in *Drosophila*

5.2 Mechanism of sex determination-genic balance theory - *Drosophila*

Homogametic and Heterogametic theory (Human, Mamalian, Birds)

5.3 X – linked inheritance (eg. Haemophilia)

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P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2017-2018)
CELL BIOLOGY & GENETICS
MODEL QUESTION PAPER

Time: 21/2 hrs. **Marks :60M**

PART - 1

Note : Answer any THREE questions choosing at least one question from each section **3 x 10 = 30**

SECTION- A

1. Write about ultra structure of Eukaryotic cell.
2. Explain in detail about Giant Chromosomes.
3. Discuss the Molecular Event in Cell cycle.

SECTION- B

4. Discuss how Incomplete Dominance and Co-Dominance is a deviation to Mendelian Principles.
5. What is Linkage? Give Cytological proof of Crossing over.
6. What is Skip Generation? Write about Haemophilia.

PART – II

Answer any FOUR Questions. **4x 5= 20M**

7. Golgi apparatus.
8. Mitochondria.
9. Significance of meiosis.
10. Law of Segregation.
11. Phenocopies.
12. Genic Balance theory.

PART – III

Answer any FIVE Questions. **5 x 2 = 10M**

13. Plasmid.
14. TMV.
15. Lamp brush chromosome.
16. G_o Phase.
17. Test cross.
18. Pleiotropism.
19. Crossing over.
20. Map distance.

P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2017-2018)
CELL BIOLOGY & GENETICS
BLUE PRINT FOR QUESTION PAPER SETTER

Time : 21/2hours **Max marks: 60**

MODULE NO.	ESSAY QUESTIONS 10 MARKS	SHORT ANSWER QUESTIONS 5 MARKS	VERY SHORT ANSWER QUESTIONS 2 MARKS	MARKS ALLOTED TO THE UNIT
MODULE – I	01	02	02	24
MODULE – II	01	01	02	19
MODULE – III	01	01	01	17
MODULE – IV	01	01	01	17
MODULE – V	02	01	02	29
Total no.of Questions	**06**	**06**	**08**	
Total Marks including choice				**106**

NOTE:The question paper setters are requested to kindly adhere to the format given in the above table.

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P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2017-2018)
SEMESTER - I

COURSE CODE – BT 2210P

BIOTECHNOLOGY PRACTICAL

Hrs : 2 **CREDITS-2**

1. Preparation of different stages of Mitosis.
2. Preparation of different stages of Meiosis.
3. Monohybrid and Dihybrid Ratio.
4. Graphical representation of data (Histograms, frequency polygen, Pie diagram).
5. Finding statistical significance of a given data using ‘t’ test.
6. Finding Mean, Median, Mode of the given problem.

P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2017-2018)
AT THE END OF I SEMESTER

MODEL PRACTICAL PAPER

Time: 2 hrs. **Marks: 50**

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1. Mount the onion root tip and identify the stage of the cell cycle. **15 M**

(Split: Principle & Procedure – 05, Conduct of Experiment – 08, Values and Report – 03**)**

2. Plot Histogram to the following data. **10M**

Class Interval	**10-20**	**20-30**	**30-40**	**40-50**	**50-60**	**60-70**
Frequency	**5**	**15**	**20**	**25**	**30**	**35**

3. Identification of Spotters**.** **3 x 5 = 15M**
(Identification– 01, Notes and diagrams (if any)– 04).

A. Zygotene.

B. Problem on monohybrid or dihybrid cross.

C. Pie diagram.

4. . Practical Record **05 M**

5. . Viva voce **05 M**

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P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
BIOTECHNOLOGY SYLLABUS
(WITH EFFECTIVE FROM 2014-2015)
SEMESTER - II
BIOMOLECULES & BIOSTATISTICS
COURSE CODE – BT 2210 BBB

Hrs : 4 **CREDITS-3**

INSTRUCTIONAL OBJECTIVES

1. To Provide Knowledge about classification, Structure and Properties of Bimolecular
2. To Impart Knowledge on Structure of DNA and Experiments that prove that DNA as Genetic Material.
3. To Provide Basic Knowledge on Biostatistics and its applications related Biology.

BIOMOLECULES

MODULE-I

Carbohydrates

1.1 Introduction, classification and properties
Structure, Functions of monosaccharides
(Glucose and fructose)

1.2 Disaccharides – Introduction,classification,properties and functions of Disaccharides
Physiologically important glycosides (streptomycin, cardiac glycosides, ouabain)

1.3 Structure and function of homo polysaccharides – starch, insulin, cellulose and glycogen
Structure and function of heteropolysaccharides – Hyaluronic acid

MODULE-II

Proteins

2.1 Introduction, Classification, structure and properties of amino acids

2.2 Peptide bond – Synthesis and characters

2.3 Primary, secondary, tertiary and quaternary structures of proteins

Lipids

2.4 Fatty acids : Introduction,classification,properties of Fatty acids.

2.5 Triacylglycerols, Sphingolipids, Sterols.
Phospholipids (phosphatidic acid, phosphatidylcholine).

NUCLEIC ACIDS

MODULE-III

3.1 DNA as the genetic material – Griffiths experiments on transformation in *Streptococcus pneumoniae*. Avery, McEleod and Mc Carty's experiments.Hershey – Chase experiments with radio-labelled T_2 bacteriophage.

3.2 RNA as genetic material – Tobacco Mosaic Virus.

3.3 Structure of DNA – Watson and Crick Model.
Forms of DNA – A, B and Z forms of DNA, Super coiled and related DNA – Role of Topoisomerases.

3.4 DNA damage, Repair and Recombination

CONCEPTS OF BIOSTATISTICS

MODULE-IV

4.1 **Introdution of Biostatistics** Concept of Probability, basic laws and its application to Mendelian segregation.

4.2 Collection, classification, Tabulation and diagrammatic and graphical representation of statistical data: Histogram, pie chart, bar diagram, frequency polygon. Measurement of central tendency: Mean, Median, Mode.

4.3 Concept of sampling and sampling distribution. Concept of test of hypothesis. Applications of t-test statistics to biological problems/data: Chi-square, statistic applications in biology.

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P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2017-2018)
SEMESTER - II
MODEL QUESTION PAPER

Time: 2 1/2 hrs. **Marks: 60M**

PART - I

Note: Answer any THREE questions choosing at least one question from each Section. **3 x 10 = 30**

SECTION- A

1. Explain classification of carbohydrates and Explain structures of glucose and fructose.
2. Write an essay on the structure, Properties and biochemical importance of SUCROSE
3. Describe the classification based on structure of Amino acids.

SECTION-B

4. Explain Experiment that Prove DNA as Genetic material.
5 Find Mode of the following data.

Class Interval	0-50	50-100	100-150	150-200	200-250	250-300	300-350
Frequency	25	14	40	91	150	87	60

6. Compare DNA with RNA and describe the various forms of DNA.

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PART – II

Answer any FOUR Questions. **4 x 5 = 20M**

6. Physiological importance of glycosides.
7. Structure and function of starch.
8. Primary and secondary structure of Proteins.
9. Sampling.
10. DNA damage.
11. pie chart.

PART – III

Answer any FIVE Questions. **5 x 2 = 10M**

12. Mutarotation.
13. Asymmetric carbon.
14. Sphingolipids
15. Retroviruse.
16. Sterols.
17. Topoisomerases.
18. Probability.
19. Histogram.

P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2017-2018)
II SEMESTER

BLUE PRINT FOR QUESTION PAPER SETTER

Time: 21/2hours **Max marks: 60**

MODULE NO.	ESSAY QUESTIONS 10 MARKS	SHORT ANSWER QUESTIONS 5 MARKS	VERY SHORT ANSWER QUESTIONS 2 MARKS	MARKS ALLOTED TO THE UNIT
MODULE – I	02	02	02	34
MODULE – II	01	01	02	19
MODULE – III	02	01	02	29
MODULE – IV	01	02	02	24
Total no. of Questions	**06**	**06**	**08**	
Total Marks including choice				**106**

NOTE:The question paper setters are requested to kindly adhere to the format given in the above table.

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P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2017-2018)
SEMESTER - II

COURSE CODE – BT 2210P

BIOTECHNOLOGY PRACTICAL

Hrs : 2 **CREDITS-2**

1. Preparation of Normal, Molar and Molal solutions.
2. Preparation of Buffers (Acidic, Neutral and Alkaline Buffers).
3. Estimation of DNA by diphenylamine method.
4. Estimation of RNA by orcinol method.
5. Qualitative tests of sugars,
6. Qualitative tests of amino acids.
7. Qualitative test of lipids.

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P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2017-2018)
AT THE END OF II SEMESTER

MODEL PRACTICAL PAPER

Time: 2hrs. **Marks: 50**

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1. Estimation of DNA by Diphenylamine method. **15 M**

(Split: Principle & Procedure – 04, Conduct of Experiment – 08, Values and Report – 03**)**

2. Identify the carbohydrate present in the given sample by qualitative estimation.**10M**

3. Identification of Spotters**.** **5 x 3 = 15M**
(Identification– 01, Notes and diagrams (if any) – 04).

   A. Problem on Molarity calculation.
   B. Colorimeter.
   C. Identification of Reagent (Description).

4. . Practical Record **05 M**

5. . Viva voce **05 M**

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Recommended Books

1. Biometry - By Sokal and Rohlf W.H. Freeman
2. Fundamentals of Biometry - By L.N. Balaram (George Allen and Unwin Ltd, London (1972)
3. Biostatistics - By N.T.J. Bailey
4. Biostatistics- Manual of biostatistical methods for use in health, nutrition and Anthropology - By K. Visweshwar Rao (Jaypee Publications).
5. Genetics - By Gardner (Macmillan Press)
6. An introduction to Genetic Analysis - By Griffith and others – Freeman and Company
7. Bioinformatics and Bioprogramming in C - By L.N. Chavali
8. Cell Biology - By S.C. Rastogi (New Age International (P) Ltd)
9. Statistical Genetics – Principles and Practice - By Prem Narain
10. Biotechnology - By K. Trehan
11. Biotechnology –1 - By R.S. Setty and G.R. Veena
12. Biotechnology – II - By R.S. Setty and V. Sreekrishna
13. Fundamentals of Genetics – By B.D. Singh, N. Pratibha, P.H. Rao and P.B. Kavi Kishor
14. Genetics - By B.D. Singh
15. Genetics - By Mohan P. Arora, Gurdarshan and S. Sandhu
16. Introduction to Bioinformatics - By V. Kothekar
17. An Introduction to Kothekar - By V. Kothekar and T. Nandi
18. Introduction to Bioinformatics - By Arthur M. Lesk
19. Cell and Molecular Biology - By De Robertis
20. Cell and Molecular Biology - By Lodish
21. Cell Biology and Genetics - By P.K. Gupta
22. Theory and Problems in Genetics - By Stransfield
23. Introduction to Bioinformatics - By T.K. Attwood, D.J. Parry-Smith, Samiron Phukan (Pearson Education)
24. Introduction to Biotechnology - By W.J. Thieman and M.A. Palladino (Pearson Education)
25. Discovering Genomics, Proteomics and Bioinformatics - By A.M. Campbell and L.J. Heyer (Pearson Education)
26. The World of the Cell - By Becker (Pearson Education)
27. Concepts of Genetics - By Klug (Pearson Education)
28. Genetics - By Strickberger (Pearson Education)
29. Biochemistry - By Dr. U. Satyanarayana, U. Chakrapani
30. Biochemistry - By Lehninger
31. Biochemistry - By J.L. Jain

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P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
BIOTECHNOLOGY SYLLABUS
(WITH EFFECTIVE FROM 2015-2016)
III SEMESTER
PAPER - II
ENZYMOLOGY AND INTERMEDIARY METABOLISM

COURSE CODE – BT 3210IM

Hrs : 4 **CREDITS-3**

INSTRUCTIONAL OBJECTIVES:

1) To Provide Knowledge on Basic Metabolism.
2) To Provide Knowledge on Photosynthetic Reaction that are occurred in Plants.

ENZYMOLOGY

MODULE- I

Enzymes

1.1 Introduction, structure, Propertiesof Enzymes
Classification and nomenclature of enzymes.
Kinetics of enzyme catalyzed reactions.

1.2 Factors influencing enzymatic reactions.
(a) pH (b) Temperature (c) Substrate concentration (d) Enzyme concentration

1.3 Enzyme Inhibition – Competitive and non-competitive.

INTERMEDIARY METABOLISM

MODULE -II

2.1 Glycolysis
2.2 Citric acid cycle
2.3 Gluconeogenesis and its significance
2.4 Mitochondrial electron transport
Chemiosmotic theory of ATP synthesis, Functions of ATP

MODULE -III

3.1 β-Oxidation of fatty acid
3.2 Biosynthesis and degradation of triacylglycerol
3.3 Deamination, decarboxylation and transamination reactions of amino acids
3.4 Catabolism of amino acids – phenyl alanine and tyrosine.
3.5 Phenylketonuria and albinism.

MODULE-IV

4.1 Biosynthesis and regulation of purine and pyramidine nucleotides, denovo and salvage pathways.
4.2 Catabolism of purines and pyramidines.
4.3 Disorders of nucleotide metabolism- Gout, lech-nyhan syndrome.
4.4 Biosynthesis and degradation of heme.

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P.R.GOVERNMENT COLLEGE (A), KAKINADA
(WITH EFFECTIVE FROM 2015-2016)
II B.Sc. BIOTECHNOLOGY
III SEMESTER
ENZYMOLOGY & INTERMEDIARY METABOLISM
MODEL QUESTION PAPER

Time: 3 hrs. **Marks: 70**

PART - 1

Note : Answer any THREE questions choosing at least one question from each Section. **10 x 3 = 30**

SECTION- A

1. Write an essay on the reactions involved in Citric acid cycle.
2. Write an essay on Mitochondrial electron transport chain.
3. Describe the various factors influencing enzymatic reactions.

SECTION- B

4. Explain the Deamination, decarboxylation and transamination reactions of amino acids.
5. Explain in detail the various biochemical reactions involved in β-oxidation of Fatty acids.
6. Write the denovo synthesis of Purine nucleotides.

PART-II (SHORT ANSWER QUESTIONS)

Answer any five questions **5X4=20**

7. Michaelis - Menten equation.
8. Energetics of Aerobic glycolysis process.
9. Competitive enzyme inhibition.
10. Significance of Gluconeogenesis.
11. Metabolic disorders of any two amino acids.
12. Deamination reaction.
13. Lesch-nyhan syndrome.
14. Heme degradation

PART-III (VERY SHORT ANSWER QUESTIONS)

Answer any Ten questions **10X2=20**

15. cofactor.
16. Cholesterol.
17. Ribozyme.
18. Difference between Hexokinase and Glucokinase.
19. Pyramidine.
20. Glucogenesis.
21. Chemiosmotic theory.
22. Feedback inhibition.
23. Triacylglycerol .
24. RUBP.
25. IMP.
26. Glycogen.

P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2015-2016)
II B.Sc. BIOTECHNOLOGY
III SEMESTER
PAPER II - ENZYMOLOGY & INTERMEDIARY METABOLISM

BLUE PRINT FOR QUESTION PAPER SETTER

Time: 3hours **Max marks: 70**

MODULE NO.	ESSAY QUESTIONS 10 MARKS	SHORT ANSWER QUESTIONS 4 MARKS	VERY SHORT ANSWER QUESTIONS 2 MARKS	MARKS ALLOTED TO THE UNIT
MODULE – I	01	02	03	24
MODULE – II	02	02	03	34
MODULE – III	02	02	03	34
MODULE – IV	01	02	03	24
Total no. of Questions	**06**	**08**	**12**	
Total Marks including choice				**116**

NOTE: The question paper setters are requested to kindly adhere to the format given in the above table.

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P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
BIOTECHNOLOGY SYLLABUS
(WITH EFFECTIVE FROM 2015-2016)
IV SEMESTER
MICROBIOLOGY & BIOPHYSICAL TECHNIQUES

COURSE CODE – BT 4210MBPT

Hrs : 4 **CREDITS-3**

INSTRUCTIONAL OBJECTIVES:

1. To impart Knowledge on Classification, Structure, Characters of Micro-organisms.
2. To Impart Knowledge on Sterilization methods and Preparation of Pure Cultures.
3. To Impart Knowledge on Principles and Applications of some Biophysical Techniques that is used in Estimation of Nucleic acids and Protein Purification.

FUNDAMENTALS OF MICROBIOLOGY

MODULE-I

1.1 Introduction, classification of microorganisms

1.2 Structure and general characters of Viruses, Bacteria, Fungi and Micro Algae (one example from each group)

1.3 Disease causing pathogens and their symptoms (examples; Typhoid, HIV only)

1.4 Isolation, identification and preservation of microorganisms (Bacteria)

MODULE -II

2.1 Identification methods of Fungi and useful Micro Algae & Bacteria

2.2 Preparation of Microbiology laboratory

2.3 Bacterial reproduction and growth kinetics (Batch and continuous cultures)

2.4 Pure cultures and cultural characteristics

BIOPHYSICAL TECHNIQUES

MODULE -III

3.1 Microscopy – Light, Inverted, Fluorescent and Electron microscopy

3.2 Colorimetry – Beer – Lambert's Law

3.3 UV-VIS Spectrophotometry.

3.4 Chromatography

(a) Paper (b) Thin Layer (c) Ion-exchange (d) Gel-filtration e) Affinity f) HPLC

MODULE -IV

5.1 Electrophoresis – Native gels and SDS-PAGE, Agarose

5.2 Centrifugation and filtration – Basic Principles

5.3 Dialysis and lyophilization

5.4 Radio isotopes and their uses in biology

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P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2015-2016)
IV SEMESTER
PAPER II – MICROBIOLOGY & BIOPHYSICAL TECHNIQUES
MODEL QUESTION PAPER

Time: 3 hrs. **Marks: 70**

PART - 1

Note: Answer any THREE questions choosing at least one question from each Section. **10 x 3 = 30**

SECTION- A

1. Describe the methods of isolation and maintenance of pure culture of bacteria.
2. Write the five kingdom classification of Whitaker.
3. Explain the methods of sterilization.

SECTION B

4. Write an essay on principle and applications of UV-Vis Spectrophotometer.
5. Describe the process of separation of proteins using SDS-PAGE.
6. Explain the uses of Radio Isotopes in biology.

PART-II (SHORT ANSWER QUESTIONS)

Answer any Five questions **5x4=20**

7. Structure of disease causing pathogen of typhoid and symptoms.
8. Principle and applications of Electron Microscope.
9. Bacterial Growth Curve.
10. Lyophilization.
11. Characteristics of pure culture.
12. Principle and applications of centrifugation.
13. Ion Exchange chromatography.
14. General characters of Fungi.

PART-III (VERY SHORT ANSWER QUESTIONS)

Answer any Ten questions **10x 2=20**

15. Pepetidoglycan layer.
16. Function of Mesosomes of bacteria.
17. Continuous culture.
18. Polychromatic light.
19. Robert Koch.
20. TLC.
21. Types of Rotors.
22. Agarose.
23. Uses of Gel filtration technique.
24. Beers-Lamberts Law.
25. Retardation factor.
26. Dialysis.

P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2015-2016)
II B.Sc. BIOTECHNOLOGY, IV SEMESTER

PAPER II – MICROBIOLOGY & BIOPHYSICAL TECHNIQUES

BLUE PRINT FOR QUESTION PAPER SETTER

Time : 3hours **Max marks: 70**

MODULE NO.	ESSAY QUESTIONS 10 MARKS	SHORT ANSWER QUESTIONS 4 MARKS	VERY SHORT ANSWER QUESTIONS 2 MARKS	MARKS ALLOTED TO THE UNIT
MODULE – I	02	02	03	34
MODULE – II	01	02	03	24
MODULE – III	02	02	03	34
MODULE – IV	01	02	03	24
Total no. of Questions	**06**	**08**	**12**	
Total Marks including choice				**116**

NOTE: The question paper setters are requested to kindly adhere to the format given in the above table.

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P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2015-2016)
II B.Sc- BIOTECHNOLOGY– PRACTICAL SYLLABUS

AT THE END OF IV SEMESTER

COURSE CODE – BT 4210P

Hrs : 2 **CREDITS-2**

1. Estimations of protein by Biuret method.
2. Estimation of total sugars by anthrone method.
3. Separation of amino acids by paper chromatography.
4. Electrophoretic separation of proteins (SDS-PAGE).
5. Technique of Micrometry (Stage and ocular).
6. Enzyme assay – Catalase.
7. Enzyme assay – amylase.
8. Preparation of routine microbiological media.
9. Isolation of common non-pathogenic bacteria.
10. Motility of Bacteria.
11. Staining and identification of bacteria – *E.coli*, *Pseudomonas*, *Bacillus* and *Staphylococcus.*

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P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
BIOTECHNOLOGY SYLLABUS
(WITH EFFECTIVE FROM 2016-2017)
SEMESTER – V
GENERAL CORE-MOLECULAR BIOLOGY
COURSE CODE – BT 5219MB

Hrs : 4 **CREDITS-3**

INSTRUCTIONAL OBJECTIVES:

1. To provide knowledge about genome organization in both Prokaryote and Eukaryote.

2. To provide knowledge on how the information present on DNA is converted into Protein.

3. To provide knowledge on Gene Expression and Regulation.

MODULE-I

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

MODULE –II

2.1 Organization of eukaryotic genes - Exons, introns, promoters and terminators
2.2 Gene families and clusters – eg. Globin gene, histones and ribosomal genes.
2.3 Mitochondrial Genome Organization.

MODULE –III

3.1 DNA Replication – Models of DNA replication (Semi-conservative, non-conservative models)
3.2 Enzymes involved in DNA Replication.
3.3 Mechanisms of DNA replication in Prokaryotes and Eukaryotes.

MODULE –IV

4.1 Enzymes involved in Transcription.
4.2 Prokaryotic transcription.
4.3 Eukaryotic transcription.
4.4 Post-transcriptional modifications (Capping, polyadenylation, splicing and alternate splicing)

MODULE -V

5.1 Translation

Genetic code and its features, Wobble Hypothesis

t-RNA Structure

Synthesis of polypeptides - initiation, elongation and termination in prokaryotes And eukaryotes

5.2 Regulation of gene expression in prokaryotes and eukaryotes

Operon concept in bacteria – Lac operon.

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P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2016-2017)
SEMESTER V
MOLECULAR BIOLOGY

MODEL QUESTION PAPER

Time: 3hrs **PART - I** **Marks: 70**

Note : - Answer any **THREE** questions choosing atleast **ONE** question from each section.

Section – A **10x3=30**

1. Describe the organization of Nuclear Genome in Eukaryotes.
2. Write an essay on Gene Families.
3. Explain semi-conservative model of DNA Replication. Explain Experiment that Prove semi-conservative model of Replication.

Section – B

4. Explain in detail about Eukayotic transcription.
5. What is an Operon? Describe Lac operon concept in Prokaryotes.
6. Write an account on initiation, elongation process in Prokaryotic Translation.

PART – II

Answer any **FOUR** questions **4x5=20**

7. Genetic code.
8. Cot curves & their significance.
9. Satellite DNA.
10. Promoters.
11. Replication in Prokaryotes.
12. Splicing.

PART – III

Answer any **TEN** questions **10X2=20**

13. Histones.
14. SSB.
15. Termination codons.
16. Essential & Non essential genes.
17. DNA ligase.
18. Exons.
19. Wobble Hypothesis
20. Ribosomes
21 RNA Polymerase
22. S – Dependent termination
23. Chaprones
24. Primer.

P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2016-2017)
SEMESTER V
MOLECULAR BIOLOGY

BLUE PRINT FOR QUESTION PAPER SETTERS

Time : 3hours **Max marks: 70**

UNIT NO. & NAME	ESSAY QUESTIONS 10 MARKS	SHORT ANSWER QUESTIONS 5 MARKS	VERY SHORT ANSWER QUESTIONS 2 MARKS	MARKS ALLOTED TO THE UNIT
MODULE – I	01	02	02	24
MODULE – II	01	01	02	19
MODULE – III	01	01	03	21
MODULE – IV	01	01	02	19
MODULE – V	02	01	03	31
Total no.of Questions	**06**	**06**	**12**	
Total Marks including choice				**114**

NOTE:The question paper setters are requested to kindly adhere to the format given in the above table.

P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
BIOTECHNOLOGY SYLLABUS
(WITH EFFECTIVE FROM 2016-2017)
SEMESTER – V
ELECTIVE (ADVANCED)
PLANT BIOTECHNOLOGY

COURSE CODE – BT 5219 A PBT

Hrs : 3 **CREDITS-2**

INSTRUCTIONAL OBJECTIVES:

1. To provide basic knowledge on different media used in Plant and
2. To impart basic Principles of Micro propagation, Gene transfer techniques and production of Transgenic plants.

MODULE-I

1.1 Composition of media (Murashige and Skoog's and Gamborg's only) . Preparation of media and methods of sterilizations.
1.2 Role of plant growth regulators in differentiation.
1.3 Induction of callus.
1.4 Meristem culture and production of virus free plants.

MODULE -II

2.1 Clonal propagation of plants on a commercial scale (Somatic embryogenesis and organogenesis).
2.2 Mass cultivation of cell cultures and process engineering – batch and continuous cultures, Bioreactors.
2.3 Production of commercially useful compounds by plant cell culture.

MODULE –III

Transgenic Plants – introduction, applications
3.1Gene constructs,vectors for the Production of Transgenic plants.
3.2Methods of gene transfer techniques (*Agrobacterium*, Micro projectile bombardment).
Applications of recombinant DNA technology in agriculture - Inroduction
4.1Production of Insect Resistance plants,
4.2 Production of therapeutic proteins from transgenic plants.
4.3 Golden rice
4.4 Plant-Derived Vaccines – Edible Vaccines, Recombinant and sub unit Vaccines

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P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2016-2017)
SEMESTER – V
ELECTIVE (ADVANCED) - PLANT BIOTECHNOLOGY
MODEL QUESTION PAPER

Time: 3hrs **Marks: 70**

Note : - Answer any **FOUR** of the following questions **4x10=40**

1. Write an essay on Meristem Culture.
2. Write an essay on Plant tissue culture media.
3. Write an essay on Bioreactors.
4. Write an essay on somatic embryogenesis.
5. Write an essay on *Agrobacterium* mediated Gene transfer techniques.
6. Write an essay on Plant derived vaccines.

PART - II

Answer any **FOUR** of the following questions **4x5=20**

7. Sterilization.
8. Role of plant growth regulators
9. organogenesis.
10. Answer any two commercially useful compounds
11. Vectors used in production of transgenic plants
12. Golden rice.

PART - III

Answer **any FIVE** of the following question **5X2=10**

13. Apoptosis.
14. Callus.
15. Explant.
16. Flavonoids.
17. Anti foaming agents
18. Ri plasmid
19. Therapeutic protein
20. Bt cotton

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P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
BIOTECHNOLOGY SYLLABUS
(WITH EFFECTIVE FROM 2016-2017)
SEMESTER – V
ELECTIVE (ADVANCED)
PLANT BIOTECHNOLOGY

BLUE PRINT FOR QUESTION PAPER SETTER

Time : 3hours **Max marks: 70**

UNIT NO.	ESSAY QUESTIONS 10 MARKS	SHORT ANSWER QUESTIONS 5 MARKS	VERY SHORT ANSWER QUESTIONS 2 MARKS	MARKS ALLOTED TO THE UNIT
UNIT – I	02	02	03	36
UNIT – II	02	02	02	34
UNIT – III	02	02	03	36
Total no.of Questions	**06**	**06**	**08**	
Total Marks including choice				**106**

NOTE: The question paper setters are requested to kindly adhere to the format given in the above table.

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REFERENCE BOOKS

1. Introduction to Plant Tissue Culture - By M.K. Razdan (Oxford and IBH Publishing Company, New Delhi)
2. Introduction to Plant Biotechnology - By H.S. Chawla (Oxford and IBH Publishing Comp., New Delhi)
3. Frontiers of Plant Tissue Culture - By T.A. Thorpe
4. Plant Tissue Culture – Theory and Practice - By S.S. Bhojwani and M.K. Razdan
5. Plant Biotechnology New Products and Applications- By J. Hammond, P. McGarvey, and V. Yusibov
6. Plant Tissue Culture – Basic and Applied - By Timir Baran Jha and B. Ghosh
7. Plant Tissue Culture - By Kalyan Kumar De

P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
BIOTECHNOLOGY SYLLABUS
(WITH EFFECTIVE FROM 2016-2017)
SEMESTER – V
ELECTIVE (ADVANCED)
ANIMAL BIOTECHNOLOGY

COURSE CODE – BT 5219B ABT

Hrs : 3 **CREDITS-2**

INSTRUCTIONAL OBJECTIVES:

1. To provide basic knowledge on different media used in Animal cell Culture.
2. To impart basic Principles of animal cell culture cell lines, IVF, and Embryo Transfer technology.

MODULE- I

1.1 Introduction to animal biotechnology.
1.2 Principles of animal cell culture – culture vessels.
1.3 Cell culture media preparation, sterilization, types of cultures.
1.4 Establishment and preservation of cell lines.
1.5 Explants and cell disaggregation.

MODULE-II

2.1 Culture of cells and tissues (including Stem cells and their application).
2.2 Organ culture
2.3 *In vitro* fertilization and embryo transfer technology.

MODULE-III

Transgenic Animals - Introduction
3.1 Vectors used in Gene transfer in animals
3.2 Methods of gene transfer – DEAE – Dextran mediated transfection, Lipofection, Electroporation, Microinjection and viral mediated gene transfer techniques.
3.2 Production of transgenic animals and molecular pharming.
3.3 Principles of *Ex vivo* and *In vivo* gene therapy.

P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2016-2017)
SEMESTER – V
ELECTIVE (ADVANCED)-ANIMAL BIOTECHNOLOGY
MODEL QUESTION PAPER

Time: 3hrs **Marks: 70**

PART - I

Note : - Answer any **FOUR** questions **4x10=40**

1. Write an account on culture media for animal cells.
2. Write an essay on Establishment and preservation of cell lines.
3. Describe the principle and steps involved in invitro fertilization and add notes on its applications
4. Define stem cells and explain the stem cell culture and add notes on applications .
5. Write an essay on different gene transfer techniques.
6. Write essay on Principles of *Ex vivo* and *In vivo* gene therapy.

PART - II

Answer any **FOUR** questions 4**x5=20**

7. Sterilization.
8. Cell disaggregation.
9. Vectors used in Gene transfer.
10. Steps involved in embryo transfer technology.
11. Organ culture.
12. Molecular pharming

PART - III

Answer any **FIVE** questions **5X2=10**

13. Cell-lines.
14. Explant.
15. Types of substrates on which cell grows.
16. Hematopoietic stem cell.
17. Mesenchymal cells.
18. Knockout mouse.
19. Dolly
20. Marker gene

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P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
BIOTECHNOLOGY SYLLABUS
(WITH EFFECTIVE FROM 2016-2017)
SEMESTER – V
ELECTIVE (ADVANCED)
ANIMAL BIOTECHNOLOGY
BLUE PRINT FOR QUESTION PAPER SETTER

Time : 3hours **Max marks: 70**

UNIT NO.	ESSAY QUESTIONS 10 MARKS	SHORT ANSWER QUESTIONS 5 MARKS	VERY SHORT ANSWER QUESTIONS 2 MARKS	MARKS ALLOTED TO THE UNIT
UNIT – I	02	02	03	36
UNIT – II	02	02	02	34
UNIT – III	02	02	03	36
Total no.of Questions	**06**	**06**	**08**	
Total Marks including choice				**106**

NOTE: The question paper setters are requested to kindly adhere to the format given in the above table.

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REFERENCE BOOKS

1. Strategies in Transgenic Animal Sciences - By Glemn M.M. and James M. Robl ASM Press 2000.
2. Practical Biotechnology – Methods and Protocols - By S. janarthanan and S. Vincent (Universities Press)
3. Animal Cells as Bioreactors - By Terence Gartoright, Cambridge Univ Press
4. Molecular Biotechnology - By Chinnarayappa (Universities Press)
5. Principles and Practice of Animal Tissue Culture - By Sudha Gangal (UniversitiesPress)
6. Guide for the care and use of lab animals - National Academy Press

P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2016-2017)
MOLECULAR BIOLOGY
PRACTICAL SYLLABUS
AT THE END OF V SEMESTER

COURSE CODE – BT 5219P

Max.Marks : 70

Hrs : 2 **CREDITS-2**

1. Isolation of Genomic DNA from bacterial cell
2. Isolation of DNA from plant/animal/bacterial cells
3. Analysis of DNA by agarose gel electrophoresis
4. Extraction of DNA from agarose gel.
5. Bacterial transformation.
6. Mutational studies of DNA.

P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2016-2017)
MOLECULAR BIOLOGY
AT THE END OF V SEMESTER

MODEL PRACTICAL PAPER

Time : 11/2hrs **Marks : 35**

MAJOR EXPERIMENT

I. Isolation of Genomic DNA. **16Marks**

(Principle – 05, Conduct of practical – 08, Report-3)

II. **IDENTIFICATION OF SPOTTERS**. **3X3=9M**

(a) Electrophoretic chamber – vertical.

(b) Ethidium Bromide(dye specific).

(c) Lac operon (diagram).

III. Record ----------5 Marks.

} **10Marks**

IV. Viva ----------5 Marks.

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P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2016-2017)
III B.Sc- BIOTECHNOLOGY

SEMESTER – V
PRACTICAL SYLLABUS

PLANT BIOTECHNOLOGY
(ADVANCED ELECTIVE)

COURSE CODE – BT 5219P

1. Media Preparation.
2. Preparation and surface sterilization of Explant.
3. Callus induction from any one selected plant species.
4. Micro propagation of plants (any one).
5. Preparation of synthetic seeds using shoot Meristem.
6. Isolation of DNA from young leaves using cTAB method.
7. Isolation of DNA from young leaves using Extraction buffer and Ammonium Acetate method
8. *Agrobacterium* mediated leaf disc Transformation in Tabacco.

P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2016-2017)
III B.Sc. BIOTECHNOLOGY

AT THE END OF V SEMESTER

PLANT BIOTECHNOLOGY-MODEL PRACTICAL PAPER

TIME: 11/2hrs **MARKS: 35**

1. Isolation of DNA from young leaves using cTAB method. 16M

(Split: Principle 02M, Procedure 03M, Experiment 8M, Report 03M)

2. **Identification of Spotters** 3×3=9M

(Identification– 01, Notes and any diagrams -02)

A.Bioreactor .

B. Micro projectile bombardment.

D. Identification of Instrument (Description).

3. Practical record	05M
4. Viva Voce	05M
Total	35M

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P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2016-2017)
III B.Sc- BIOTECHNOLOGY

SEMESTER – V
PRACTICAL SYLLABUS

ANIMAL BIOTECHNOLOGY
(ADVANCED ELECTIVE)

COURSE CODE – BT 5219P

1. Preparation of animal cell culture media.
2. Sterility test of media and serum.
3. Media storage, serum inactivation.
4. Development of primary cell lines/maintenance of established cell lines.
5. Initiation of Primary Culture from Chick Embryo
6. Preparation of single cell suspension from spleen / liver / thymus.
7. Cell counting and cell viability.
8. Trypsinization of monolayer and sub culturing.
9. Preparation of metaphase chromosomes from cultured cells.
10. MTT assay for cell viability and growth.
11. Cell fusion with PEG.

P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2016-2017)
III B.Sc. BIOTECHNOLOGY

AT THE END OF V SEMESTER

ANIMAL BIOTECHNOLOGY-MODEL PRACTICAL PAPER

TIME: 11/2hrs **MARKS: 35**

I.Major Experiment :

1. Metaphase chromosomes preparation from cultured cells. 16M

(Split: Principle 02M, Procedure 03M, Experiment 8M, Report 3M)

II. **Identification of Spotters** 3×3=9M

(Identification– 01, Notes and diagram (if any) – 02)

A. Micro injection .

B.Any culture vessels .

C. PEG

III. Practical record 05M

IV. Viva Voce 05M

Total 35M

P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
BIOTECHNOLOGY SYLLABUS
(WITH EFFECTIVE FROM 2016-2017)
SEMESTER – VI
GENERAL CORE-GENETIC ENGINEERING AND IMMUNOLOGY
COURSE CODE – BT 6219 IMrDNA

Hrs : 4 **CREDITS-3**

INSTRUCTIONAL OBJECTIVES:

1. To provide Knowledge about Basic techniques that is used in Gene Cloning.
2. To provide knowledge about advanced techniques.
3. To Provide Knowledge on Basic Immunology such as Structure of Antigens, Antibodies and MHC, Hypersensitivity Reactions.

RECOMBINANT DNA TECHNNOLOGY

MODULE-I

1.1 Introduction to r-DNA technology.

1.2 Enzymes used in gene cloning : Restriction endonucleases, Ligases, Phosphatases, Methylases, Kinases

1.3 Cloning vehicles – Plasmids, Cosmids, Phage vectors, Shuttle vectors,

1.4 Baculovirus vector system, Expression vectors - expression cassettes

1.5 Construction of genomic and cDNA libraries

MODULE -II

2.1 Identification of cloned genes

2.2 Principles involved in Blotting Techniques – Southern, Northern and Western

2.3 Principles and Applications of PCR Technology

2.4 DNA Finger printing technique and its applications.

BASICS OF IMMUNOLOGY

MODULE -III

3.1 Introduction to immune system – Organs and cells of the immune system

3.2 Antigens, Haptens – physico-chemical characteristics

3.3 Structure of different immunoglobulins and their functions
Primary and secondary antibody responses

3.4 Antigen - Antibody Reaction

MODULE –IV

4.1 The Major Histocompatibility gene complex and its role in organ transplantation
Generation of antibody diversity

4.2 Hypersensitivity – Coombs classification, Types of hypersensitivity

4.3 Autoimmune diseases – mechanisms of auto immunity.

4.4 Vaccines – types.

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P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2016-2017)
GENETIC ENGINEERING AND IMMUNOLOGY
SEMESTER – VI
MODEL QUESTION PAPER

Time: 3hrs **PART - I** **Marks: 70**

Note : - Answer any **THREE** questions choosing atleast **ONE** question from each section.

Section – A **10x3=30**

1. Write the principle & applications of PCR technique.
2. Write an account on DNA & RNA blotting techniques.
3. Describe the procedure to contract the C-DNA libraries.

Section – B

4. Explain the structure & functions of different types of immonoglobulins.
5. Describe MHC – gene complex & their role in transplantation.
6. Explain in detail about Antigen – Antibody reactions.

PART - II

Answer any **FOUR** questions **4x5=20**

7. Cloning vectors.
8. DNA finger printing technique.
9. Restriction endonucleases.
10. Physico-chemical characteristics of Antigens.
11. Type – I hypersensitivity reaction.
12. Mechanisms of autoimmunity.

PART - III

Answer any **TEN** questions **10X2=20**

13. Shuttle vector.
14. DNA ligase.
15. Western blotting.
16. Plasmids.
17. Genomic libraries.
18. Expression vectors.
19. Macrophages
20. Agglutination
21. Hapten
22. Secondary Antibody response
23. Edible vaccines
24. Immunity.

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P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2016-2017)
SEMESTER VI
IMMUNOLOGY & r-DNA TECHNOLOGY

BLUE PRINT FOR QUESTION PAPER SETTERS

Time : 3hours **Max marks: 70**

UNIT NO. & NAME	ESSAY QUESTIONS 10 MARKS	SHORT ANSWER QUESTIONS 5 MARKS	VERY SHORT ANSWER QUESTIONS 2 MARKS	MARKS ALLOTED TO THE UNIT
MODULE – I	01	02	03	26
MODULE – II	02	01	03	31
MODULE – III	02	01	03	31
MODULE – IV	01	02	03	26
Total no.of Questions	**06**	**06**	**12**	
Total Marks including choice				**114**

NOTE:The question paper setters are requested to kindly adhere to the format given in the above table.

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P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
BIOTECHNOLOGY SYLLABUS
(WITH EFFECTIVE FROM 2016-2017)
SEMESTER – VI
ELECTIVE (SKILL BASED)
INDUSTRIAL BIOTECHNOLOGY

COURSE CODE – BT 6219A IBT

Hrs : 3 **CREDITS-2**

INSTRUCTIONAL OBJECTIVES:

1. To impart knowledge on Industrial biotechnology and metabolic products of microorganisms.
2. To impart knowledge on Fermentation technology and Production of Useful products through fermentation like amylase and antibiotics.

INDUSTRIAL BIOTECHNOLOGY

MODULE-I

1.1 Introduction to industrial biotechnology.
1.2 Primary and secondary metabolic products of microorganisms.
1.3 Screening and isolation and preservation of industrial microorganisms.

MODULE-II

2.1 Principles of Fermentation technology.
2.2 Fermentative production of microbial enzymes (amylases, proteases), and antibiotics- Pencillin. And Vitamin B12
2.3 Fermentative production of foods and dairy products – Cheese Production and Yogurt.

MODULE-III

3.1 Commercial production of fuels - Bioethanol
3.2 Production of Citric Acid
3.3Animal cells as bioreactors; characteristics of bioreactors, expression and over production of targeted proteins – human growth hormones – production of α and β - interferons, monoclonal antibodies.
3.4 Single Cell Protein
3.5 Good manufacturing practices, Biosafety issues, Bioethics.
3.6 Intellectual Property Rights and Patenting issues.

P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2016-2017)
SEMESTER – VI
ELECTIVE (SKILL BASED)-INDUSTRIAL BIOTECHNOLOGY
MODEL QUESTION PAPER

Time: 3 hrs. **Marks :70M**

PART - I

Answer any FOUR questions **4 x 10 = 40**

1. Describe various types of culture systems in fermentation technology.
2. What are primary and secondary metabolites? Write an essay on characteristics and functions of secondary metabolites.
3. Explain the process of microbial production of penicillin .
4. Write an essay on steps involved in fermentative production of cheese.
5. Write an essay on Bioethics.
6. Write an essay Monoclonal Antibodies.

PART – II

Answer any FOUR Questions. **4x 5= 20**

7. Interferons
8. Good Management Practices.
9. Steps in production of Yogurt.
10. Applications of Industrial Biotechnology.
11. Lyophilization and cryopreservation
12. Steps involved in amylase production

PART – III

Answer any FIVE Questions. **5 x 2 = 10**

13. Batch culture.
14. Biomass
15. Patent.
16. Trade mark.
17. Polyclonal antibodies.
18. Protease.
19. Serial dilution.
20. Impeller.

P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
BIOTECHNOLOGY SYLLABUS
(WITH EFFECTIVE FROM 2016-2017)
SEMESTER – VI
ELECTIVE (ADVANCED)
INDUSTRIAL BIOTECHNOLOGY
BLUE PRINT FOR QUESTION PAPER SETTER

Time : 3hours **Max marks: 70**

UNIT NO.	ESSAY QUESTIONS 10 MARKS	SHORT ANSWER QUESTIONS 5 MARKS	VERY SHORT ANSWER QUESTIONS 2 MARKS	MARKS ALLOTED TO THE UNIT
UNIT – I	01	02	03	26
UNIT – II	03	02	02	44
UNIT – III	02	02	03	36
Total no.of Questions	**06**	**06**	**08**	
Total Marks including choice				**106**

NOTE: The question paper setters are requested to kindly adhere to the format given in the above table.

REFERENCE BOOKS

1. Industrial Microbiology - By L.E. Casida
2. Food Microbiology - By M.R. Adams and M.O. Moss
3. Bioethics – Readings and Cases - By B.A. Brody and H. T. Engelhardt. Jr.(Pearson Education)
4. Biotechnology, IPRs and Biodiversity - By M.B. Rao and Manjula Guru (Pearson Education)
5. Bioprocess Engineering - By Shuler (Pearson Education

6.Industrial Biotechnology -By S.N.Jogdand

P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
BIOTECHNOLOGY SYLLABUS
(WITH EFFECTIVE FROM 2016-2017)
SEMESTER – VI
ELECTIVE (SKILL BASED)
ENVIRONMENTAL BIOTECHNOLOGY

COURSE CODE – BT 6219B EBT

Hrs : 3 **CREDITS-2**

MODULE-I

1.1 Introduction to environmental biotechnology.
1.2 Renewable and non-renewable energy resources.
1.3 Conventional energy sources and their impact on environment.
1.4 Non-conventional fuels and their impact on environment – Production of Biogas, microbial hydrogen production.

MODULE –II

2.1 Waste Treatment – Treatment of Solid waste.
2.2 Microbiological treatment of municipal and industrial effluents.
2.4 Digestion of Organic slurries
2.3 Microbiological analysis of milk, food and water.

MODULE -III

Xenobiotic compounds - introduction
3.1 Microbial degradation of pesticides and toxic chemicals.
3.2 Biopesticides and Biofertilizers (Nitrogen fixing, phosphate solubilizing microorganisms).
3.3 Microbial ore leaching.
3.4 Introduction to Bioremediation, Biostimulation and Bioaugmentation.

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P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2016-2017)
SEMESTER – VI
ELECTIVE (SKILL BASED)-ENVIRONMENTAL BIOTECHNOLOGY
MODEL QUESTION PAPER

Time: 3 hrs. **Marks :70M**

PART - I

Note : Answer any FOUR questions **4 x 10 = 40**

1. Write an essay on Renewable and non-renewable energy resources.
2. Write an essay on production of Biogas.
3. Define biodegradation & explain the process of biodegradation of pesticides and toxic chemicals.
4. Write an essay on Biofertilizers.
5. Write an essay on various methods used in Microbiological treatment of Municipal water.
6. Write an essay on various methods used in Microbiological treatment of Industrial effluents.

PART – II

Answer any FOUR Questions. **4x 5= 20**

7. Non-conventional fuels.
8. Microbial Hydrogen Production.
9. MBRT.
10. Digestion of organic slurry.
11. Microbial ore leaching
12. Bioremediation

PART – III

Answer any TEN Questions. **10 x 2 = 20**

13. Sludge.
14. Bioethanol.
15. Gobar gas.
16. Bio pesticide.
17. Bioaugmentation.
18. DO
19. Xenobiotics.
20. Thiobacilli.

P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
BIOTECHNOLOGY SYLLABUS
(WITH EFFECTIVE FROM 2016-2017)
SEMESTER – VI
ELECTIVE (ADVANCED)
ENVIRONMENTAL BIOTECHNOLOGY
BLUE PRINT FOR QUESTION PAPER SETTER

Time : 3hours **Max marks: 70**

UNIT NO.	ESSAY QUESTIONS 10 MARKS	SHORT ANSWER QUESTIONS 5 MARKS	VERY SHORT ANSWER QUESTIONS 2 MARKS	MARKS ALLOTED TO THE UNIT
UNIT – I	02	02	02	34
UNIT – II	02	02	03	36
UNIT – III	02	02	03	36
Total no.of Questions	**06**	**06**	**08**	
Total Marks including choice				**106**

NOTE: The question paper setters are requested to kindly adhere to the format given in the above table.

REFERENCE BOOKS

1. Biogas Technology - By B.T. Nijaguna
2. Biotechnology – I - By R.S. Setty and G.R. Veena
3. Biotechnology – II - By R.S. Setty and V. Sreekrishna
4. Biotechnology - By K. Trehan
5. Essentials of Biotechnology for Students - By Satya N. Das
6. Essentials of Biotechnology - By Irfan Ali Khan and Atiya Khanum (Ukaaz Publications)

P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2016-2017)
IMMUNOLOGY r-DNA TECHNOLOGY PRACTICAL SYLLABUS
AT THE END OF VI SEMESTER

COURSE CODE – BT 5219P

Max. Marks - 70

Hrs : 2 **CREDITS-2**

1. Restriction digestion of DNA.
2. Ligation of DNA
3. PCR
4. Preparation of competent cells of Bacteria
5. Bacterial transformation and selection of transformants under pressure (antibiotic).
6. Blotting techniques – Western blotting.
7. Immuno-diffusion test.
8. ELISA Test.
9. Microagglutination using microtiter plates (eg. ABO and Rh blood grouping).

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P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2016-2017)
MOLECULAR BIOLOGY& IMMUNOLOGY r-DNA TECHNOLOGY
AT THE END OF VI SEMESTER

MODEL PRACTICAL PAPER

Time : 11/2hrs **Marks : 35**

I. Identify the blood group of given blood sample by microagglutination using microtiter plates. **16 Marks.**

(Principle -5, Procedure – 6, Diagrams + Report – 5).

II. **IDENTIFICATION OF SPOTTERS**. **3X3=9M**

(a) Western blot apparatus – vertical.

(b) Any Two restriction enzymes.

(c) PCR.

III. Record ----------5 Marks.

} **10Marks**

IV. Viva ----------5 Marks.

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P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2016-2017)
III B.Sc- BIOTECHNOLOGY-PRACTICAL SYLLABUS

SEMESTER – VI
INDUSTRIAL BIOTECHNOLOGY

(SKILL BASED ELECTIVE - I)

COURSE CODE – BT 6219P

1. Isolation of industrially important Microorganisms.
2. Effect of incubation temperature on growth.
3. Production of wine using common yeast.
4. Estimation of alcohol by colorimetry.
5. Growth curves of bacteria, Measurement of growth in liquid cultures.
6. Lethal effect of temperature on microorganisms (TDT).

P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2016-2017)
III B.Sc. BIOTECHNOLOGY

AT THE END OF VI SEMESTER

INDUSTRIAL BIOTECHNOLOGY-MODEL PRACTICAL PAPER

TIME: 11/2hrs **MARKS: 35**

I Major Practical

I. Estimation of alcohol by colorimetry. 16M

(Split: Principle 05M, conduct of practical – 08M, Report 03M)

II. **Identification of Spotters** 3×3=9M

(Identification– 01, Notes and Diagram (if any) – 02).

(a). Bioreactor .

(b). Any Instrument.

(c).Growth curve.

III. Practical record 05M

IV. Viva Voce 05M

Total 35M

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P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2016-2017)
III B.Sc- BIOTECHNOLOGY

SEMESTER – VI
PRACTICAL SYLLABUS

ENIVIRONMENTAL BIOTECHNOLOGY
(SKILL BASED ELECTIVE)

COURSE CODE – BT 6219P

1. Determination of total dissolved solids of water.

2. Determination of D.O Concentration of water sample.

3. Determination of BOD of a sewage sample.

4. Determination of COD of a sewage sample.

5. Isolation of microbes from industrial effluents.

6. Production of hydrogen or biogas using cow/cattle dung.

7. Quality testing of milk by MBRT.

P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2016-2017)
III B.Sc. BIOTECHNOLOGY

AT THE END OF VI SEMESTER

ENVIRONMENTAL BIOTECHNOLOGY-MODEL PRACTICAL PAPER

TIME: 11/2Hrs **MARKS: 35**

I. Determination of DO of a sewage sample. 16M

(Split: Principle 05M, conduct of practical 08M, Report 03M)

II. **Identification of Spotters** 3×3=9M

(Identification– 01, Notes and diagrams (if any) – 02).

(a). Any Lab instrument.

(b). Serial dilution method - diagram.

(c). MBRT-Principle.

III. Practical record	05M
IV. Viva Voce	05M
Total	35M

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REFERENCE BOOKS

1. Concepts in Biotechnology - By D. Balasubramanian, C.F.A. Bryce, K. Dharmalingam,J.Greenand Kunthala Jayaraman
2. Essential Immunology - By I. Roitt, Publ: Blackwell
3. Molecular Biology of the Gene - By Watson, Hopkins, Goberts, Steitz and Weiner (Pearson Education)
4. Cell and Molecular Biology - By Robertis & Robertis, Publ: Waverly
5. Text Book of Biotechnology - By H.K. Das (Wiley Publications)
6. Gene Structure & Expression - By J.D. Howkins, Publ: Cambridge
7. Genetic Engineering - By R. Williamson, Publ: Academic Press
8. Test Book of Molecular Biology - By K.S. Sastry, G. Padmanabhan & C.Subramanyan, Publ: Macmillan India
9. Microbial Genetics - By S.R. Maloy, J.E. Cronan & D. Freifelder, Publ: Jones & Barlett
10. Principles of Gene Manipulation - By R.W. Old & S.B. Primrose, Publ: Blackwell
11. Genes - By B. Lewin - Oxford Univ. Press
12. Molecular Biology & Biotechnol. - By H.D. Kumar, Publ: Vikas
13. Immunology - By G. Reever & I. Todd, Publ: Blackwell
14. From Genes to Clones - By E.L. Winnacker, Publ: Panima, New Delhi
15. Methods for General & Molecular Bacteriology - By P. Gerhardf et al., Publ:ASM
16. Molecular Biotechnology - By G.R. Glick and J.J. Pasternak, Publ: Panima
17. Recombinant DNA - By J.D. Watson et al., Publ: Scikentific American Books
18. Immuno diagnostics - By S.C. Rastogi, Publ: New Age
19. Molecular Biology - By D. Freifelder, Publ: Narosa
20. Genes and Genomes – By Maxine Singer and Paul Berg
21. Cell and Molecular Biology - By S.C. Rastogi
22. Genetic Engineering and Biotechnology - By V. Kumar Gera
23. Essentials of Biotechnology – By P.K. Gupta
24. Immunology - By Kubey
25. Gene Biotechnology - By Jogdand
26. Genome - T.A. Brown
27. Gene Cloning - T.A. Brown
28. Biotechnology, IPRs and Biodiversity - By M.B. Rao and Manjula Guru (Pearson Education)
29. Introduction to Biotechnology - By W.J. Thieman and M.A. Palladino (Pearson Education)
30. Genetic Engineering - By Boylan (Pearson Education)
31. Basic Concepts of Biotechnology - By Irfan Ali Khan and Atiya Khanum (Ukaaz Publications)
32. Advances in Biotechnology - By Irfan Ali Khan and Atiya Khanum (Ukaaz Publications)