Model Question Paper

M.Sc. Agricultural Biotechnology – Semester I

Core Paper 101: Cell Biology

Time: 3 Hours Maximum Marks: 85

Answer any Five Questions
All Questions carry equal Marks

1. Describe the structure, organization and functions of cell wall.

2. Give a detailed account of the structyure, models and functions of Plasma membrane.

3. Give an account of plant vacuole structure and functions with special reference to ATPases and transporters.

4. Write short notes on any Three of the following:
   a) Cell walls as food, feed and fibres
   b) Ion carriers
   c) Plasmodesmata
   d) Tonoplast membrane

5. Describe The Chloroplast membrane organization and role of different photo systems in converting the solar energy to chemical energy.

6. Give an account of organization and function of mitochondrial genome.

7. What are Microtubules? Explain role of Microtubules in Chromosome movements.

8. Write short notes on any Four of the following:
   a) Trachides
   b) Microbodies
   c) RNA editing
   d) Lysosomes
   e) Kinetic energy

Model Question Paper

M.Sc. Agricultural Biotechnology – Semester I

Core Paper 102: Genomes and Genes

Time: 3 Hours Maximum Marks: 85

Answer any Five Questions
All Questions carry equal Marks

1. Explain the molecular organization of genomes.

2. Describe meiosis in autotetraploids.

3. Explain various types of gene interaction.

4. Write brief account of any Two of the following:
   a) Chromosome banding
   b) Haploids
   c) Chromosome mapping using primary trisomics

5. Outline the methods of molecular map construction.

6. Distinguish between nuclear and cytoplasmic types of inheritance. With suitable examples explain plastid inheritance.

7. Describe meiosis and breeding behaviour in translocation heterozygotes.

8. Write short notes on any Four of the following:
   a) Centromere
   b) Karyotype analysis
   c) Nullisomics
   d) U`s triangle
   e) Multiple alleles
   f) Pleiotropism

Model Question Paper

M.Sc. Agricultural Biotechnology – Semester I

Core Paper 103: Basics of Agriculture and Plant Breeding

Time: 3 Hours Maximum Marks: 85

Answer any Five Questions
All Questions carry equal Marks

1 Explain briefly the factors effecting Agriculture and the classification of Agricultural crops.

2. Describe the methods of breeding self pollinated crops.

3. What is Heterosis? Explain its genetic basis and significance in Plant Breeding.

4. Write notes on any Two of the following:
   a) Plant introduction
   b) Centres of origin of Crop Plants
   c) Clonal selection

5. Write an account on the process of Apomixis and its use in crop improvement.

6. Explain the molecular basis of mutations with suitable examples.

7. Give an account on the origin, evolution and cultivation practices of Sugar cane.

8. Write short notes on any Four of the following:
   a) Introgression
   b) Amphiploids
   c) Curing of Tobacco
   d) Cultivation of Cotton
   e) Cultivation of Wheat

Model Question Paper

M.Sc. Agricultural Biotechnology – Semester I

Core Paper 104: Molecular Biology

Time: 3 Hours Maximum Marks: 85

Answer any Five Questions
All Questions carry equal Marks

1. Describe the double helical structure of B-DNA. Explain how it differs from Z-DNA.

2. Describe the methods RNA priming in Prokaryotes.

3. Write an essay on DNA damage and the mechanisms involved in its repair.

4. Write short notes on any Three of the following:
   a) Uni and Bidirectional replication
   b) Overlapping genes
   c) Polycistronic mRNA
   d) Base pair analogues
   e) Telomerases

5. Ribosomes are the moving factories of protein synthesis – substantiate.

6. Write an essay on signal transduction mechanisms.

7. Explain how proteins are transported to different regions in a cell.

8. Write short notes on any Three of the following:
   a) Spliceosome
   b) Polyadenylation
   c) DNA methylation
   d) Lac operon
   e) EF - Tu factors

Model Question Paper

M.Sc. Agricultural Biotechnology – Semester II

Core Paper 201: Tissue Culture

TIME: 3hrs Max.Marks: 85

Answer Any Five Questions.

All Questions Carry Equal Marks

1. Write an account of basic concepts of Tissue Culture
2. Write an essay on pathways of regeneration
3. Write short notes on any **four** of the following
    a. Tissue Culture Cycle
    b. Phytohormones
    c. Sterilization Methods
    d. Toti potency
    e. Plating efficiency.
4. Write an essay on androgenic and genomic haploid production.
5. Write an essay on micro propagation of horticulture and fruit yielding plants.
6. What is somaclonal variation? Mention its applications.
7. Write an essay on secondary metabolite production in Tissue Culture.
8. Write notes on any **four** of the following
    a. Embryo rescue
    b. Cell culture
    c. Hybrids
    d. Biotransformation.
    e. Dihaploid.

Model Question Paper

M.Sc. Agricultural Biotechnology – Semester II

Core Paper 202: Tools and Techniques of Genetic Engineering

TIME: 3hrs Max.Marks: 85

Answer Any Five Questions.

All Questions Carry Equal Marks

1. What is site directed mutagenesis? Explain the various methods employed in achieving it.
2. Briefly discuss on the general properties of plasmids and any two vectors constructed based on them
3. Write an essay on concepts and mechanisms of restriction digestion.
4. Write short notes on any **four** of the following
   a. Artificial mini chromosome
   b. Homopolymer tailing
   c. Reporter genes
   d. Dot and slot blots
   e. Selectable markers.
5. Explain the basic technique of PCR and its modifications citing their uses in genetic engineering
6. Describe the methods of DNA sequencing and their advantages and disadvantages
7. Write on how the DNA and proteins are separated by blotting techniques.
8. Write short notes on any **four** of the following
   a. Chromosome walking
   b. Colony hybridization
   c. DNA micro-arrays
   d. C-DNA library
   e. Polynucleotide kinase

Model Question Paper

M.Sc. Agricultural Biotechnology – Semester II

Core Paper 203: Agricultural Microbiology

TIME: 3hrs Max.Marks: 85

Answer Any Five Questions.

All Questions Carry Equal Marks

1. With the help of a labelled diagram, describe the structure of a prokaryotic cell.
2. Give an account of photosynthetic Bacteria
3. Discuss the role of microorganisms in transformation of nitrogenous compounds.
4. Write notes on any **four** of the following
    a. Endospores
    b. Nucleoid.
    c. Organic matter decomposition
    d. Sexduction
    e. Plasmid.
5. Write briefly about the genes involved in lytic and lysogenic cycles.
6. What is meant by parasexual cycle? Explain with the help of a mitosporic fungus.
7. Write a concise account on Cyanobacterial biofertilizers.
8. Write short notes on any **four** of the following
    a. Nif genes
    b. Nematode
    c. Auxotroph
    d. Rhizobium
    e. Cryptic sex.

Model Question Paper

M.Sc. Agricultural Biotechnology – Semester II

Core Paper 204: Microbial and Molecular Genetics

TIME: 3hrs Max.Marks: 85

Answer Any Five Questions.

All Questions Carry Equal Marks

1. Give structure and life cycle pattern of Yeast and Neurospora.
2. Explain genetic fine structure analysis of r 11 locus and its outcome.
3. What is tetrad analysis and how is it useful in gene mapping?
4. Write short note on any **four** of the following
    a. Sex duction
    b. Interrupted mating
    c. Specialized transduction
    d. Transformation
    e. Mutant phenotype in Bacteria
5. Explain the structural organization and mechanism of transposition of prokaryotic transposans.
6. Give an account of RFLP, RAPD markers and their use in construction of genetic maps
7. What is negative and positive regulation of gene expression in prokaryotes? Explain with suitable examples
8. Write short notes on any **four** of the following
    a. Nif genes
    b. Environmental control or gene expression
    c. Structure of t_4 phage
    d. Copia elements
    e. Nodulation genes.

Model Question Paper

M.Sc. Agricultural Biotechnology – Semester III

Core Paper 301: Plant Metabolic Engineering

TIME: 3hrs Max.Marks: 85

Answer Any Five Questions.

All Questions Carry Equal Marks

1. What is metabolism? Write about Sucrose metabolism.
2. Discuss about CO2 fixation mechanism and their importance in plants.
3. What is Lipigenesis? Discuss the fatty acid biosynthesis and its importance.
4. Write short notes on any Three of the following:
   a) Hexose phosphate pool
   b) Plastome
   c) Photorespiration
   d) Starch
5. Give an account on secondary metabolism and discuss the importance of Alkaloids in Medicine and Agriculture.
6. What is regulation? Explain the Allosteric inhibition and its significance in metabolism.
7. Enumerate the genetic engineering application in Plant metabolism and describe the metabolic pathways transfer through genetic engineering.
8. Write short notes on any Three of the following:
   a) Metabolic rigidity
   b) G-Proteins
   c) β-Oxidation
   d) Role of Terpinoids in Plant Tissue Culture

Model Question Paper

M.Sc. Agricultural Biotechnology – Semester III

Core Paper 302: Crop Protection and Integrated Pest Management (IPM)

TIME: 3hrs Max.Marks: 85

Answer Any Five Questions.

All Questions Carry Equal Marks

1. What are plant disease epidemics? Write briefly about the pathogen factors that effect development of epidemics.
2. Give a concise account on the genetics of plant pathogen interactions.
3. What are the major genetic engineering methods used for the development of bole worm resistant Cotton.
4. Write short notes on Two of the following:
    a) Herbicide resistance
    b) Green Revolution
    c) Bacterial pesticides
5. Out line the concepts of Biological Control giving the classical examples.
6. What is Integrated Pest Management? Outline the principles involved in the implementation of IPM.
7. Write short notes on any Two of the following:
    a) IPM motules for Cotton
    b) Mycopesticides
    c) Horizontal and Vertical resistance
8. Write a concise essay on Transgenic Crops in Agriculture.

Model Question Paper

M.Sc. Agricultural Biotechnology – Semester III

Core Paper 303: Agro-Economics

TIME: 3hrs Max.Marks: 85

Answer Any Five Questions.

All Questions Carry Equal Marks

1. Define Agricultural Economics and examine its nature and scope.
2. Analyze the relationship of Agriculture with Industry and other Sciences.
3. State and explain the Law of variable proportions.
4. Write short on any Four of the following:
   a) Production function
   b) Properties of Cobb, Douglas production function
   c) Leas cost combination of factors
   d) Production possibility Curve
   e) Properties of Is quant
   f) Credit rationing
5. Explain the concept of Uncertainty in Agriculture and examine the methods adopted by farmers to safe guard against uncertainty.
6. Examine the causes for the poor performance of institutional credit agencies in fulfilling the credit requirements of farmers in India and suggest measures to overcome these.
7. Analyze the impact of liberalization and globalization on Indian Agriculture.
8. Write short on any Four of the following:
   a) Functions of regulated markets
   b) Need for input subsidies in Agriculture
   c) Food security
   d) Objectives of Agricultural price policy
   e) Decentralized planning
   f) Types of risks in Agriculture

Model Question Paper

M.Sc. Agricultural Biotechnology – Semester III

Core Paper 304: Biostatistics

TIME: 3hrs Max.Marks: 85

Answer Any Five Questions.

All Questions Carry Equal Marks

1. What do you understand by measures of central tendency? Describe the main types of such measures and their characters.

2. Describe the various types of measures of dispersion and their significance.

3. Explain the uses of Chi-square test giving suitable examples.

4. Write short notes on any Three of the following:
   a) Ogive
   b) Pie-chart
   c) Probability
   d) Properties of Poisson distribution

5. Write the properties of Binomial distribution, Outline the method of fitting Binomial distribution to a hypothetical data.

6. Explain the method of regression analysis.

7. What is Analysis of variance? Explain the method of one way ANOVA.

8. Write short notes on any Three of the following:
   a. Student t-test
   b. Spearman's Rank correlation
   c. Randomized Block design
   d. Test for equality

Model Question Paper

M.Sc. Agricultural Biotechnology – Semester IV

Core Paper 401: Agricultural Biodiversity and Intellectual Property Rights

Time: 3hours Max.Marks: 85

Answer any five of the following
All Questions Carry equal Marks

1. Define biodiversity and explain the various historical and geographical causes for biodiversity add a note on the importance of biodiversity.
2. Describe the methods used for the maintenance of ecological biodiversity
3. What are the various strategies used for conservation of biodiversity? Describe briefly the molecular characterization of biodiversity.
4. Write short notes on any four of the following
   a). Genetic diversity
   b) TRIPS
   c). Quantification of biodiversity
   d). Vulnerability
   e). Centers of origin of plants
   f) Extinction
5. What is IPR Explain its necessity and give some case studies supporting its need
6. Explain how species are classified into categories based on their existing population levels giving examples to each category
7. Write in detail about the global biodiversity information systems
8. Write short notes on any four of the following
   a. Species and population biodiversity
   b. Biodiversity hot spots
   c. Red data books
   d. Biopiracy
   e. Molecular diversity
   f. Endemism

Model Question Paper

M.Sc. Agricultural Biotechnology – Semester IV

Core Paper 402: Bioinformatics

Time: 3hours Max.Marks: 85

Answer any five of the following
All Questions Carry equal Marks

1. Write a concise account on Intra and Internet concept and packages.

2. Give an account on NCBI.

3. Describe the difference in the strategy of Whole Genome Sequencing and Shot Gun Sequencing.

4. Write short notes on any Three of the following:
   a) Web browser
   b) PIR
   c) Gene annotation
   d) Proteomics

5. Give an account on Global and Local alignment and the algorithms involved.

6. Describe the various methods of prediction of secondary structure of proteins.

7. Give an account of BLAST. Mention the various kinds of BLAST.

8. Write short notes on any Three of the following:
   a) BLOSSUM
   b) Boot strapping
   c) Dot Plot
   d) Protein docking

Model Question Paper

M.Sc. Agricultural Biotechnology – Semester IV

Core Paper 403: Seed Technology

Time: 3hours Max.Marks: 85

Answer any five of the following
All Questions Carry equal Marks

1. Write in detail about the Physiological stages of Seed development with suitable diagrams
2. Mention the different stages of seed germination and factors influencing it
3. Answer any four questions
    A. ISTA
    B. Certified Seed
    C. Polyembryony
    D. Cryopreservation
    E. Carbohydrates of Seed
4. Discuss different types and benefits of Seed Treatment
5. Write an Essay on types and conditions to break endogenous dormancy
6. List out the requirements of seed storage and factors affecting the longevity of seed
7. Give the Objectives of seed certification with detailed description of any one of the minimum seed certification standards
8. Answer any four questions
    A. Vivipary
    B. Synthetic Seed encapsulation
    C. Seed Processing
    D. Factors affecting dormancy
    E. Recalcitrant Seed

Model Question Paper

M.Sc. Agricultural Biotechnology – Semester IV

Core Paper 404 : Agricultural Applications of Genetic Engineering

Time: 3hours Max.Marks: 85

Answer any five of the following
All Questions Carry equal Marks

1. Write a brief account of the general methods of gene transfer in prokaryotes
2. Citing any three examples describe how the transgenic studies improve the nutritional quality of crops plants
3. Write on assay on the concept of vaccines and their further improvement in using DNA manipulation.
4. Describe any four areas where the transgenic have improved the tomato crop in certain aspects
5. Write short notes on any three of the following
   a). EPSPS
   b). Ti plasmid
   c). Improvement of betalrines
   d). Electroporation
   e) Role of transgenesis in male sterility
   f). GFP gene
6. Describe the mechanism and consequences of terminator technology.
7. Explain the role of genetic engineering in confirming resistance to herbicides.
8. Write short notes on any three of the following
   a). Vanillin production
   b). GUS gene
   c). Co integrative plasmids
   e) Somatic cell hybridization
   d). Direct DNA transfer
   f). Stress tolerance