R–2998

Sub. Code
501201

M.Sc. DEGREE EXAMINATION, APRIL 2019

Second Semester

Biotechnology

IMMUNOBIOLOGY

(CBCS – 2016 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

All questions carry equal marks.

1. Define antigen.
2. Write a short note on B and T lymphocytes.
3. What is meant by antigenic determinants?
4. Define Immunogens.
5. What is meant by anaphylatoxins?
6. Define antigen processing.
7. What is meant by Haplotype?
8. Define protozoan.
9. Define isograft.
10. Write a note on oncogenes.

Part B $(5 \times 5 = 25)$

Answer **all** questions choosing either (a) or (b).

All questions carry equal marks.

11. (a) Describe the structure and function of thymus.

Or

(b) Explain the role of Toll like receptor in innate immunity.

12. (a) Write a note on cytokines and its function.

Or

(b) Write a note on the factors that influence immunogenicity.

13. (a) Explain the classical pathway of complement system.

Or

(b) Explain in detail about endocytic pathways of antigen processing and presentation.

14. (a) Discuss the mechanism of immune response to viral infection.

Or

(b) Write a brief note on immune dysfunction.

15. (a) Write a short notes on HLA tissue typing.

Or

(b) Write a note on clinical application of stem cells.

Part C (3 × 10 = 30)

Answer any **three** questions.

All questions carry equal marks.

16. Discuss in detail about activation, maturation and differentiation of B-cells.

17. Give a elaborate note on the classification, structure and function of immunoglobulins.

18. Explain in detail about the mechanisms of antigen processing and presentation.

19. Discuss in detail about the class of MHC and its peptide interaction.

20. Explain in detail about different types of hypersensitivity reactions.

———————

R–2999

Sub. Code
501202

M.Sc. DEGREE EXAMINATION, APRIL 2019.

Second Semester

Biotechnology

RECOMBINANT DNA TECHNOLOGY

(CBCS – 2016 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

All questions carry equal marks.

1. Taq polymerase.
2. DNA ligase.
3. Cosmids.
4. Multiple cloning sites (MCS).
5. Linkers.
6. Zoo blot.
7. Inverse PCR.
8. DNA foot printing.
9. Interferons.
10. ADA.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Write a short note on DNA polymerase and its types.

Or

(b) Explain in detail about the following nucleases S1 and Bal 31.

12. (a) Write a short note on M13 vectors.

Or

(b) Discuss in detail about His tag expression vector.

13. (a) Describe the construction of cDNA library.

Or

(b) Explain the steps of Southern blotting in detail with its applications.

14. (a) Comment on PCR and applications in forensics.

Or

(b) Write a short note on ligase chain reaction.

15. (a) Discriminate native proteins from fusion proteins.

Or

(b) Explain in detail about genetic counseling along with its applications.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain about DNA polymerase and its types used in rDNA technology.

17. Write a note on artificial chromosomes and its advantages.

18. Discuss in detail about various methods involved in screening of recombinants.

19. Write a detailed note on second and third generation sequencing methods.

20. Discuss in detail about clinical and forensic application of rDNA technology.

———————

R–3000	Sub. Code 501203

M.Sc. DEGREE EXAMINATION, APRIL 2019.

Second Semester

Biotechnology

PLANT MOLECULAR BIOLOGY

(CBCS – 2016 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

All questions carry equal marks.

1. Introns.
2. Promiscuous DNA.
3. Cryopreservation.
4. Vitrification.
5. Elicitors
6. Agroinfection.
7. Molecular farming.
8. Flavr Savr Tomatoes.
9. GUS.
10. Abiotic stress.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Write a short note on Arabidopsis Genome Initiative (AGI).

Or

(b) Briefly discuss about the organization of mitochondrial genome with suitable example.

12. (a) Write a short note on synthetic seeds.

Or

(b) How RAPD is used for identification of plants?

13. (a) Discriminate co-integrate vector from binary vectors.

Or

(b) Comment on Marker Assisted Selection (MAS).

14. (a) What is stress and discuss in detail about various Abiotic stress that generally creates water deficit.

Or

(b) Write a short note on Transposon tagging.

15. (a) Discuss about various selectable markers used in plant expression vectors.

Or

(b) Write a short note on phytoremediation.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Discuss about genetic engineering of chloroplast genome and development of Transplastomic plants.

17. Explain the use of DNA based methods in analyzing the plant genetic diversity and improvement.

18. Give a detailed account on Agrobacterium mediated transformation of food crops.

19. Describe the methods of gene transfer methods in plants.

20. How will you produce herbicide tolerance plants using genetic engineering approach?

———————

R–3001

Sub. Code
501204

M.Sc. DEGREE EXAMINATION, APRIL 2019

Second Semester

Biotechnology

Lab III — MOLECULAR GENETICS

(CBCS – 2016 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Phage titration.
2. Genetic markers.
3. Ames test.
4. Auxotrophic mutants.
5. Electroporation.
6. Hfr conjugation.
7. Transduction.
8. Bacteriophage.
9. Transposons.
10. Insertional Inactivation.

Part B $(5 \times 5 = 25)$

Answer **all** questions choosing either (a) or (b).

11. (a) Comment on titration of phages.

Or

(b) Write about one step growth curve.

12. (a) Give a brief note on isolation of Auxotrophic mutants.

Or

(b) Discuss on induced mutagenesis.

13. (a) Comment on complement cell preparation.

Or

(b) Give a note on microinjection.

14. (a) Mention the applications of Bacteriophage.

Or

(b) How do understand by gene mapping by P_1 transduction?

15. (a) List the applications of Transposons.

Or

(b) Describe the types of Transposons.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain single colony isolation and checking for genetic markers.

17. Give a detailed account on site directed mutagenesis.

18. Discuss the methods of transformation.

19. Elaborate the types of transduction.

20. Comment on Transposons and its mutagenesis.

———————

R–3002

Sub. Code
501205

M.Sc. DEGREE EXAMINATION, APRIL 2019

Second Semester

Biotechnology

Lab IV — IMMUNOTECHNOLOGY

(CBCS – 2016 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

All questions carry equal marks.

1. Explain the importance of HGPRT in hybridoma.
2. Define the term immunization.
3. Write a principles of MTT formation assay.
4. Define agglutination.
5. Comment on phycoerythrin.
6. How to separate PBMC from blood?
7. Write a note on enzymatic diagrregation.
8. Define microcarrier.
9. What is meant by cell synchronization?
10. Write a short note on RIA.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

All questions carry equal marks.

11. (a) Write a note on methods of bleeding and serum collection.

Or

(b) List out the application of monoclonal antibodies in clinical diagnosis.

12. (a) Describe the different types of antigen-antibody reactions.

Or

(b) Write a note on immunohistochemical staining.

13. (a) Explain the various methods to detect apoptotic cells.

Or

(b) Explain the importance of FACS in lymphocyte diagnosis.

14. (a) Write a note on analysis the expression of immunoglobulin by RT-PCR.

Or

(b) Explain in detail about types of culture media and its preparation for cell line culture.

15. (a) Explain in detail about the types of ELISA.

Or

(b) Write about principle and application of Western blotting.

Part C (3 × 10 = 30)

Answer any **three** questions.

All questions carry equal marks.

16. Discuss in detail about monoclonal antibody production by hybridoma technology.

17. Write a elaborate note on the various methods to access antigen-antibody reaction.

18. Explain in detail about ABO and Rh grouping.

19. Write brief note on establishment of primary culture.

20. Discuss in detail about the kits for identification of infectious agent with suitable example.

———————

R–3003

Sub. Code
501502

M.Sc. DEGREE EXAMINATION, APRIL 2019

Second Semester

Biotechnology

MARINE ECOSYSTEM AND PRINCIPLES OF OCEANOGRAPHY

(CBCS – 2016 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

All questions carry equal marks.

1. What is ecological factor? Give examples.
2. What is Benthos?
3. Define captive breeding.
4. What is alien species in marine biodiversity?
5. What is waves and tides?
6. What is Somali current?
7. What are the major elements of seawater?
8. What are the instruments used to analyze depth of ocean?
9. What is biological rhythm?
10. What is green house effect?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain how ecological factors affect the lives in marine environment.

Or

(b) Write a short note on coral bleaching with neat sketch.

12. (a) Explain eastern boundary current.

Or

(b) Explain the importance of marine diversity.

13. (a) Write a note on habitat fragmentation.

Or

(b) Explain thermovent.

14. (a) Explain about the dissolved gases in seawater.

Or

(b) Write a short note on minor elements in seawater.

15. (a) Explain green house effect and give its importance.

Or

(b) Explain Camouflage.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain Oceanic Zone and the lives occupied in each zone.

17. Explain the molecular techniques used in measuring the marine biodiversity.

Ws9

18. Explain marine currents.

19. Explain oceanographic instruments and sampling methods.

20. Explain marine food web dynamics.

———————

R–3213	Sub. Code
	501101

M.Sc. DEGREE EXAMINATION, APRIL 2019.

First Semester

Biotechnology

BIOCHEMISTRY

(CBCS – 2016 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

All questions carry equal marks.

1. Define entropy.
2. State the Laws of Thermodynamics.
3. What is biological energy transducers?
4. Define Oxidative Phosphorylation.
5. Difference between mediated and non-mediated transport mechanisms.
6. State the role of membrane proteins in defense mechanism.
7. What you mean by inborn errors of metabolism. Any one example.
8. What is organic acidemia?
9. What is an enzyme how does it work?
10. What is a Vmax in enzyme kinetics?

Part B (5 × 5 = 25)

Answer **all** questions, by choosing either (a) or (b).

11. (a) What are chemical bonds? And what is the difference between intermolecular and intermolecular forces? Explain with an example.

Or

(b) Write the structure and function of Cyanocobalamin.

12. (a) Write the structure and function of ATP.

Or

(b) Write the TCA cycle.

13. (a) State briefly about the electrical properties of membranes.

Or

(b) What are the different types of membrane transport? Explain with one example.

14. (a) Write the metabolic pathway of gluconeogenesis and state the importance.

Or

(b) What is metabolic disorder? And what are the symptoms?

15. (a) Define Enzyme, Coenzyme and cofactors and their importance.

Or

(b) What are vitamins and explain the deficiency diseases associated.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain in detail about the stabilizing interactions in cell.

17. Describe in detail about the electron transport chain and Oxidative phosphorylation.

18. Sketch the importance of sodium potassium ions in membranes.

19. Explain-Glycolysis and the disorders of carbohydrate metabolism.

20. Define Enzyme kinetics and the general properties of enzyme catalysis.

———————

R–3214

Sub. Code
501102

M.Sc. DEGREE EXAMINATION, APRIL 2019

First Semester

Biotechnology

MICROBIOLOGY

(CBCS – 2016 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Edward jenner
2. Prokaryotes and Eukaryotes
3. RNA and DNA virus
4. Fermentation
5. Pathogenicity
6. Nosocomial infection
7. DGGE
8. ARDRA
9. Parasitism
10. BCA

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Briefly explain about the important criteria used in classification of microorganisms.

Or

(b) Explain kingdom concept.

12. (a) Give a short note on structure of Bacterial cell.

Or

(b) Discuss about properties of viruses.

13. (a) Write about host pathogen interaction.

Or

(b) Explain about microbial pathogenicity.

14. (a) Write short notes on ecological niche.

Or

(b) Discuss about metagenomic library.

15. (a) List out the applications of microorganisms in fermentation.

Or

(b) Explain mutualism commensalism.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Elaborate the criteria used in the classification of microorganisms.

17. Discuss about the classification of viruses.

18. Give an account on microbial diseases and host pathogen interaction.

19. Write an essay on the molecular methods used in assessing microbial diversity.

20. Explain the role of microorganisms in the field of industrial microbiology.

———————

R–3215

Sub. Code
501103

M.Sc. DEGREE EXAMINATION, APRIL 2019

First Semester

Biotechnology

CELL BIOLOGY

(CBCS – 2016 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Nucleus.

2. Peroxisomes.

3. Ion channels.

4. Chloroplast.

5. Cellular differentiation.

6. Composition of plant cell wall.

7. Apoptosis.

8. Chaperons.

9. Virus.

10. Oncogenes.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Detail in overview of plant and animal cells.

Or

(b) Explain the intermediate filaments.

12. (a) Write about the electrical properties of membrane.

Or

(b) Explain the structure of model membrane.

13. (a) Write an account of cellular differentiation in plants.

Or

(b) Detail in regulation of cellular differentiation.

14. (a) Explain the cell fusion and its application.

Or

(b) Briefly explain the structural organization and function of proteasome.

15. (a) Give a short note on cancer and the cell cycle.

Or

(b) Explain the any two hormonal disturbance theories.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Write an essay on microtubules and associated proteins.

17. Explain the cell cycle and its regulation.

18. Detail in basic process and mechanisms.

19. Detail in chaperons- classification and cellular function.

20. Narrate theories regarding mutation.

———————

R–3216

Sub. Code
501104

M.Sc. DEGREE EXAMINATION, APRIL 2019

First Semester

Biotechnology

MOLECULAR BIOLOGY AND GENETICS

(CBCS –2016 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

All questions carry equal marks.

1. Define RNA splicing.
2. Define DNA polymerase I.
3. What is gene silencing?
4. What is Lysogeny?
5. Photo reactivation.
6. What is heat shock response?
7. What are transmissible plasmid?
8. Explain Hfr.
9. Define eugnenics.
10. Define translocation.

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Explain about wobble hypothesis.

Or

(b) Write a short note on structure and types of RNA.

12. (a) Write about organization of genes in eukaryotes.

Or

(b) Explain about lac operon.

13. (a) Discuss the genetic analysis of mutant.

Or

(b) Write short notes on

(i) excision repair

(ii) site-directed mutagenesis.

14. (a) What are the types of transposable elements?

Or

(b) Comment on triparental mating.

15. (a) Write a short note on genome imprinting.

Or

(b) Write about Polygenetic inheritance and its measurement.

Part C (3 × 10 = 30)

Answer any **three** questions.

Draw diagram and flow chart wherever necessary.

16. Give a detail account on transcription.

17. Explain in detail of lysogenic growth of λ phage and describe their mechanism.

18. Write a detail notes on the types of mutation and inducing agents.

19. Give a detail sketch on transformation.

20. Discuss in detail about pedigree analysis.

———————

R–3217

Sub. Code
501105

M.Sc. DEGREE EXAMINATION, APRIL 2019.

First Semester

Biotechnology

LAB I – ANALYTICAL BIOCHEMISTRY

(CBCS – 2016 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. Define Beer-lamberts law and complementary colours.

2. Define the principle of Bradford's method.

3. How will you collect mitochondria and cytosol for enzyme assays?

4. Give the clinical significance of amylase.

5. Define the principle of HPTLC.

6. Define acid-base titration.

7. Define dialysis.

8. Define FPLC.

9. Define radioactivity.

10. Give the types of rotors.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain the methods of protein estimation.

Or

(b) Write short note on clinical application of spectroflorimetry.

12. (a) Define MM equation.

Or

(b) Explain the methods of evaluating the risk of heart diseases.

13. (a) Write short note on HPTLC.

Or

(b) Derive Henderson – Hasselbach equation.

14. (a) Write short note on Ion exchange chromatography.

Or

(b) Write short note on affinity chromatography.

15. (a) Explain Probability distributions.

Or

(b) Write short note on the measurement of radioactivity.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain the principle, instrumentation and clinical applications of mass spectroscopy.

17. Explain the clinical significance of enzyme assays.

18. How the pKa values will be evaluated in acid-base titration?

19. Explain the principle, instrumentation and clinical applications of gas chromatography.

20. Explain the principle and methodologies of native and SDS PAGE.

———————

R–3218

Sub. Code
501106

M.Sc. DEGREE EXAMINATION, APRIL 2019.

First Semester

Biotechnology

Lab II — MICROBIOLOGY

(CBCS – 2016 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

All questions carry equal marks.

1. Define fluorescence microscope.
2. What is culture media?
3. Define endospore staining.
4. What are mortility determination?
5. Define growth curve.
6. What is antibiotics?
7. Define Anaerobes.
8. Define preservation of microbes.
9. What is starch hydrolysis?
10. Define TSI.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Describe about the fluorescence microscope.

Or

(b) Write notes on different types of culture media.

12. (a) Give details notes on pure culture technique.

Or

(b) Describes about hanging drop method.

13. (a) Give short notes on antibiotic producing microorganisms.

Or

(b) Write notes on drug resistant mechanisms.

14. (a) Describes about Bioreactors.

Or

(b) Write short notes on principle and methods of preservation of microbes.

15. (a) Give short notes on IMVIC tests.

Or

(b) Describe about Nitrate reduction.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Write the principle and application of Bright field and phase contrast Microscope.

17. Give details about the techniques of Acid fast staining and Endospore staining.

18. Explain the screening and identification of enzymes, antibiotic producing microorganisms.

19. Explain the principle and methods of preservation of microbes.

20. Describe the biochemical tests : Carbohydrate fermentation and IMVIC tests.

———————

R–3219

Sub. Code
501501

M.Sc. DEGREE EXAMINATION, APRIL 2019

First Semester

Biotechnology

BIOPHYSICS AND INSTRUMENTATION

(CBCS – 2016 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is meant by peptide bond?

2. Define weak interactions.

3. Hydrophobic and Hydrophilic.

4. Define tRNA and miRNA.

5. GM counter.

6. Electrodialysis.

7. Sedimentation.

8. Ion-exchange chromatography.

9. NMR.

10. Phase contrast.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain in brief various types of Bond.

Or

(b) Discuss Vander Waals forces.

12. (a) With illustrations discuss detail Ramachandran plot.

Or

(b) Discuss protein structure -function relationship.

13. (a) Describe (i) autoradiography (ii) dosimeter.

Or

(b) Discuss safely aspects in radioactive materials.

14. (a) Describe any two types of centrifuges.

Or

(b) Explain basic principles of Electrophoresis with examples.

15. (a) Discuss in brief X-ray diffraction.

Or

(b) Discuss Bragg's law in real and reciprocal space

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Discuss basic principles of biophysical chemistry.

17. Describe primary, secondary, tertiary, quaternary structure of protein with example.

18. Discuss with example the application of radioactive isotopes in biological studies.

19. Write in detail about (a) TLC (b) HPTLC (c) HPLC (d) Nano LC and FPLC.

20. Explain the image processing methods in microscopy.

———————

R–3220

Sub. Code
501301

M.Sc. DEGREE EXAMINATION, APRIL 2019

Third Semester

Bio-Technology

BIOINFORMATICS

(CBCS – 2016 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

All questions carry equal marks.

1. Name two biological database.
2. Name two open source software in bioinformatics.
3. Discuss sequences alignment.
4. Define phylogenic analysis.
5. Discuss sequence assembly.
6. Define (a) domain (b) motif.
7. Name any two software for protein structure visualization.
8. Define proteomics.
9. What are the requirements for a drug?
10. Discuss ADMET analysis.

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

All questions carry equal marks.

11. (a) Explain in brief about EMBOSS package.

Or

(b) Discuss in detail about Protein sequence and structure databases.

12. (a) Write an account on evolutionary analysis.

Or

(b) Describe (i) CLUSTALW (ii) MEGA.

13. (a) Explain any two tools used for RNA structure analysis.

Or

(b) Discuss restriction mapping and primer design.

14. (a) Discuss briefly the usage of MASCOT.

Or

(b) Discuss protein structure and visualization tools.

15. (a) Differentiate

(i) Pharmacogenomics

(ii) Pharmocokinetics.

Or

(b) What are the steps involved in Homology Modeling?

Part C (3 × 10 = 30)

Answer any **three** of the following.

16. Discuss (a) GenBank (b) RefSeq (c) UniProt (d) PDB (e) PUBMED.

17. Explain (a) sequence alignment (b) Scoring Matrix (c) PAM (d) BLOSUM.

18. Describe the various methods for protein secondary and tertiary structure prediction.

19. Discuss interaction databases and various protein interactions.

20. Discuss in detail about computer aided drug design.

———————

R–3221

Sub. Code
501302

M.Sc. DEGREE EXAMINATION, APRIL 2019

Third Semester

Biotechnology

ANIMAL BIOTECHNOLOGY

(CBCS – 2016 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

All questions carry equal marks.

1. What is micromanipulation?
2. What you mean by knock out mice?
3. Give any two advantages of using baculovirus.
4. Write a note on herpes virus.
5. Comment on inositol triphosphate.
6. Write a note on GPCR.
7. What is Gene therapy?
8. Comment on RFLP.
9. Define Totipotency.
10. What is bioethics?

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

All questions carry equal marks.

11. (a) Write a note on transgenic animals in cancer research.

Or

(b) Give a brief note on cryopresevation of embryo.

12. (a) Explain the structure and therapeutic application of SV40.

Or

(b) Discuss the characteristic features of herpes virus.

13. (a) How will you produce a protein based vaccine using animal biotechnology with suitable example.

Or

(b) Explain briefly the role of second messenger in signal transduction.

14. (a) Explain in vivo Gene therapy.

Or

(b) Give a brief note on Chemical mismatch cleavage.

15. (a) What are stem cells. Justify how these cell differ from other somatic cells.

Or

(b) Comment on the merits and demerits bioethics of stem cell research.

Part C (3 × 10 = 30)

Answer any **three** questions.

All questions carry equal marks.

16. Write in elaborate the methods of introducing the rDNA into the cell and write down their advantages and disadvantages.

17. Explain in detail about the various animal viral vectors used in the gene transfer along with the merits and demerits.

18. Give an account on G-protein coupled receptor.

19. Explain the Phage display technology and its application.

20. Discuss in detail about stem cell treatment in cancer.

———————

R–3222

Sub. Code
501303

M.Sc. DEGREE EXAMINATION, APRIL 2019

Third Semester

Biotechnology

MARINE BIOTECHNOLOGY

(CBCS – 2016 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

All questions carry equal marks.

1. Sponges.
2. Comment on carrageenan.
3. Piezophiles.
4. Write a short note on Extremophile.
5. Comment of GFP.
6. What are probiotics?
7. Write a short note on transgenic fish.
8. Antifreeze genes.
9. Write a short note on Artemia.
10. Write a short note on Semi-intensive farming.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

All questions carry equal marks.

11. (a) Write a note on bioremoval of heavy metal.

Or

(b) Write a note on bioactive compounds from Sponges.

12. (a) Write a note on applications of extremophilic organisms.

Or

(b) Explain in detail about hyperthermophilic microorganisms.

13. (a) Outline the principle of polymerse chain reaction.

Or

(b) Write an short note on characteristics and application of GFP.

14. (a) Explain in detail about transgenic fish.

Or

(b) Write a short note on transposon in fishes.

15. (a) Write a note on induced breeding.

Or

(b) Give an account of artificial feeds in aquaculture.

Part C (3 × 10 = 30)

Answer any **three** questions.

All questions carry equal marks.

16. Give a account on seaweed and its application.

17. Give a detailed account of occurrence, characteristics and exploitation of unculturable bacteria.

18. Explain in detail about gene probes and their application in disease diagnosis.

19. Discuss in detail about the commercial importance of chromosomal manipulation in marine organisms.

20. Explain in detail about Shrimp and fin-fish production farming.

———————

R–3223

Sub. Code
501304

M.Sc. DEGREE EXAMINATION, APRIL 2019

Third Semester

Biotechnology

LAB V — RECOMBINANT DNA TECHNOLOGY

(CBCS – 2016 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. How will you check the purity of DNA and RNA spectroscopically?

2. Define orcinol method of RNA quantification.

3. What is cohesive and blunt end?

4. What is M13 vector?

5. What is polytailing?

6. What is end-labelling?

7. Define DGGE.

8. Define RT PCR.

9. Define DNA profiling.

10. What are the different stages of *C. elegans*?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Isolation of RNA from animal tissue.

Or

(b) Isolation of DNA from gram negative bacteria.

12. (a) Write a short note of southern blot technique.

Or

(b) Explain sub-cloning in M13 vector.

13. (a) Explain DGGE.

Or

(b) Explain ARDRA.

14. (a) Write short note on expression of GFP-protein in C. elegans.

Or

(b) Explain the maintenance of C. elegans in laboratory.

15. (a) Explain SDS PAGE.

Or

(b) Explain FPLC.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain the procedure for isolating DNA from bacteria and plant.

17. Explain the construction and screening of genomic library.

18. Write a detailed note on labelling and detection of nucleic acid sequences.

19. Explain how wild-type and mutants of *C. elegans* will be identified. Give the advantages of using *C. elegans* as a model system.

20. Explain the techniques used to purify the downstream products.

———————

R–3224

Sub. Code
501305

M.Sc. DEGREE EXAMINATION, APRIL 2019

Third Semester

Biotechnology

Lab VI — PLANT BIOTECHNOLOGY

(CBCS – 2016 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. Aspetic culture
2. Plant regeneration
3. RAPD
4. Genetic stability
5. Cryopreservation
6. Encapsulation
7. Ti-plasmid DNA
8. Binary vector
9. PCR analysis
10. Biolistic transformation

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain explants tissue culture.

Or

(b) Write the importance of sterile environment in tissue culture.

12. (a) Difference between organogenesis and somatic embryogenesis in plants.

Or

(b) Short note on ISSR.

13. (a) Write note on Encapsulation technique.

Or

(b) Short notes on Synthetic seeds.

14. (a) Write the principle of Genomic DNA extraction.

Or

(b) Write about the purification procedure of Ti-Plasmid.

15. (a) Explain about the mechanism of *Agrobacterium rhizogenes* mediated transformation.

Or

(b) Short notes on Transient β-glucuronidase GUG gene expression assay

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Write in detail about the sterilization of various explants.

17. RAPD analysis of invitro conserved and wild type medicinal plants for genetic stability.

18. Explain in detail about micropropagation of endangered medicinal plants.

19. Detailed notes on Cloning of abiotic responsive genes into binary vector.

20. What is PCR and define its role in DNA analysis?

———————

R–3225

Sub. Code
501506

M.Sc. DEGREE EXAMINATION, APRIL 2019

Third Semester

Biotechnology

IPR, BIOSAFETY AND BIOETHICS

(CBCS – 2016 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. What is GATT?

2. What conditions an innovation must fulfill in order to become eligible for a patent?

3. Write about Madrid Agreement.

4. What is Budapest Treaty?

5. What do you understand by containment?

6. Explain Biosafety.

7. What are GMO's. Give any four examples?

8. What is the need of risk analysis?

9. What do you mean by Bioethics?

10. Explain some of the risks associated with genetic engineering.

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Write a short note on WIPO.

Or

(b) What is the difference between Tangible and intangible property?

12. (a) What amounts to Infringement of Copyright? and How is Copyright transferred?

Or

(b) What are biosafety levels?

13. (a) Explain Hague Agreement.

Or

(b) Write about Indian Patent Act.

14. (a) Write about the overview of national regulatory authorities of Biosafety.

Or

(b) Explain Cartagena Protocol of Biosafety.

15. (a) Write a note on genetic engineering and biowarfare.

Or

(b) Explain ethical, legal and socio economic aspects of gene therapy.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain various types of IPR.

17. Write about GATT and TRIPS agreements.

18. Write in detail about the Biosafety guidelines and regulations of Government of India.

19. Describe the process of risk analysis in terms of transgenic research.

20. Explain the framework of ethical decision making.

———————

R–3226

Sub. Code
501707

M.Sc. DEGREE EXAMINATION, APRIL 2019

Biotechnology

BIO-STATISTICS

(CBCS – 2016 onwards)

(ID Paper)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Write the formula for weighted average.

2. Define Range.

3. Define sample space.

4. Write any two examples of Poisson distribution.

5. Write the Kendall's coefficient of correlation.

6. What is Tetrochoric correlation coefficient?

7. Define small sample.

8. What is coefficient of contingency?

9. What is ANOVA?

10. Write the difference between the variation between classes and variation within classes.

Part B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) Prove that the algebraic sum of the deviation of a set of n values from their mean is zero.

Or

(b) Find the standard deviation and coefficient of variation for the following marks of 10 students.

20, 22, 27, 30, 40, 48, 45, 32,31, 35.

12. (a) Explain about the conditional probability.

Or

(b) In a binomial distribution the mean is 4 and the variance is 8/3. Find the mode of the distribution.

13. (a) Out of the two lines of regression given by $x + 2y - 5 = 0$ and $2x + 3y - 8 = 0$ which one is the regression line of x on y.

Or

(b) Write the application of correlation in biology.

14. (a) Explain the test for the significance population mean when population variance is known.

Or

(b) A random sample of size 25 from a population gives the sample standard deviation 8.5. Test the hypothesis that population standard deviation is 10.

15. (a) The following is the statistics showing the lives in hours of four batches of electric bulbs sold in different shops. Perform an analysis of variance and state your conclusion.

Batches	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8
A	1600	1610	1650	1680	1700	1720	1800	–
B	1580	1640	1640	1700	1750	–	–	–
C	1460	1550	1600	1620	1640	1660	1740	1820
D	1510	1520	1530	1570	1600	1680	–	–

Or

(b) Explain the two-way classification.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Find the
    (a) mean
    (b) median
    (c) first quartile for the following frequency distribution.

Class	frequency	Class	frequency
11-15	8	36-40	41
16-20	15	41-45	28
21-25	39	46-50	16
26-30	47	51-55	4
31-35	52	Total	250

17. Explain
    (a) Mutually exclusive events
    (b) Mutually exhaustive events
    (c) Binomial distribution and
    (d) Normal distribution.

18. Explain the partial and multiple correlation coefficient of three variables.

19. Explain χ^2-test for the goodness to fit and the independence of attributes.

20. Explain Kruskal-Wallis one way analysis of variance by ranks.

———————