

Reg.No :

Name :

MAHATHMA GANDHI UNIVERSITY, KOTTAYAM

MGU-UGP (HONOURS) REGULAR EXAMINATION OCTOBER 2026

FIFTH SEMESTER

DISCIPLINE SPECIFIC CORE COURSE (DSC A) – MG5DSCBTG300- RECOMBINANT DNA TECHNOLOGY

(2024 ADMISSION ONWARDS)

Duration: 1½

Maximum Marks: 50

Remember(K), Understand(U), Apply(A), Analyse(An), Evaluate(E), Create(C), Skill(S), Interest(I) and Appreciation (Ap)

Students should attempt at least one question from each course outcome to enhance their overall outcome attainability

Part A

One word Answer

Answer any **10** questions

Each question carries **2** marks

1. Name the enzyme that joins two DNA fragments by forming phosphodiester bonds. [K] / [CO1]
2. Identify the sequencing platform based on semiconductor detection. [U] / [CO3]
3. Name the method that uses high-velocity particles for DNA delivery [K] / [CO2]
4. Which marker detects single-base variations? [K] / [CO3]
5. Name one selectable marker used in plant genetic transformation. [K] / [CO2]
6. What does PCR stand for? [U] / [CO3]
7. Which reporter protein exhibits green fluorescence? [K] / [CO2]
8. Name one E. coli cloning vector derived from pBR322. [K] / [CO1]
9. What is the term for short double-stranded oligonucleotides used in DNA-end modification? [U] / [CO1]
10. Write one application of chromosome walking. [A] / [CO3]
11. Identify the selectable marker that confers resistance to hygromycin. [U] / [CO2]
12. Which technique detects protein–DNA interaction by retardation of DNA migration? [K] / [CO3]

(2×10= 20)

Part B

Short Essay Questions

Answer any **4** questions

Each question carries **5** marks

13. Explain the different enzymes used for in vitro modification of nucleic acids, with special reference to restriction endonucleases and DNA ligases. [U]/[CO1]
14. Discuss the desirable properties of a plasmid cloning vector with suitable examples. [K]/ [CO1]
15. Explain the principle and workflow of Illumina sequencing [K]/ [CO3]
16. Describe insertional inactivation as a method for screening recombinant clones. [U]/ [CO2]
17. Describe electroporation as a method of gene transfer. Mention its advantages and limitations. [K]/ [CO2]
18. Compare M13 vectors and λ phage vectors with respect to their important features and applications. [An]/[CO1]

(5×4= 20)

Part C

Essay Questions

Answer any 1 questions

Each questions carries 10 marks

19. Illustrate gene therapy as an application of recombinant DNA technology. Explain its basic concept, approaches and potential applications [An]/[CO3]
20. Describe Agrobacterium-mediated transformation in plants in detail. [U]/ [CO2]

(10×1= 10)

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Duration: 1.5 Hours

Maximum Marks: 50

Students should attempt at least one question from each course outcome to enhance their overall outcome attainability.

One word answer

Answer any **10** questions.

Each question carries **2** marks

- | | |
|---|--------------|
| 1. What is meant by an enzyme–substrate (ES) complex? | [K] / [CO1] |
| 2. Name one enzyme used in the food industry. | [U] / [CO4] |
| 3. What is meant by substrate specificity? | [K] / [CO1] |
| 4. Define the active site of an enzyme. | [K] / [CO1] |
| 5. Why is carrier selection important in enzyme immobilization? | [An] / [CO4] |
| 6. What is site-directed mutagenesis? | [K] / [CO4] |
| 7. State the role of enzymes in lowering activation energy. | [U] / [CO1] |
| 8. Define uncompetitive inhibition. | [K] / [CO2] |
| 9. Expand the term abzyme. | [U] / [CO4] |
| 10. What is meant by transition state? | [K] / [CO1] |
| 11. Define the active site of an enzyme. | [K] / [CO1] |
| 12. What is the role of feedback inhibition? | [U] / [CO3] |

(10X2= 20)

Short essay

Answer any **5** questions.

Each question carries 4 marks

- | | |
|---|---------------|
| 13. Define enzymes and explain their major characteristics. | [U] / [CO1] |
| 14. Describe the applications of enzymes in detergent and textile industries. | [App] / [CO4] |
| 15. Differentiate between cofactors, coenzymes, and prosthetic groups. | [U] / [CO1] |
| 16. Explain encapsulation as a method of enzyme immobilization. | [U] / [CO4] |
| 17. Write a short note on the basic principles of enzyme engineering. | [App] / [CO4] |
| 18. What is an allosteric enzyme? | [U] / [CO3] |

(4X5=20)

Part C

Essay

Answer any **1** question.

Each question carries **10** marks

19. Give an account of enzyme nomenclature and classification. Explain the EC numbering system and the classification of enzymes based on the reactions they catalyse. [U] / [CO1]
20. Explain Michaelis–Menten kinetics. Derive the Michaelis–Menten equation and discuss the significance of K_m and V_{max} . [U] / [CO2]

(1X10=10)

MAHATMA GANDHI UNIVERSITY, KOTTAYAM
MGU-UGP (HONOURS) REGULAR EXAMINATION OCTOBER 2026
FIFTH SEMESTER
ELECTIVE – MG5DSEBTG300 - BIOTECHNOLOGY AND ENTREPRENEURSHIP
(2024 ADMISSION ONWARDS)

Duration: 2 Hours

Maximum Marks: 70

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)

Students should attempt at least one question from each course outcome to enhance their overall outcome attainability.

Part A

One word answer

Answer any **10** questions.

Each question carries **2** marks

1. Define Bioentrepreneurship. [U] / CO1
2. Name any two essential traits of a successful bioentrepreneur. [K] / CO1
3. What is the significance of bioentrepreneurship in the modern business landscape? [U] / CO1
4. Give one example of a contribution of biotechnology to economic growth. [K] / CO1
5. Define Intellectual Property Rights. [U] / CO2
6. What is a patent? [U] / CO2
7. Name the act that governs trademarks in India. [K] / CO2
8. What is the term of protection for copyright in India? [K] / CO2
9. Name any one major funding agency supporting bioentrepreneurs in India. [K] / CO3
10. Mention one policy initiative of the Indian Government for biotechnology. [K] / CO3
11. Give an example of a global partnership in biotechnology. [K] / CO3
12. Name one major area of medical biotechnology entrepreneurship. [K] / CO4

(10 × 2 = 20)

Part B

Short essay questions

Answer any **4** questions.

Each question carries **5** marks

13. Explain the link between biotechnology and entrepreneurship. [U] / CO1
14. Describe the essential bio entrepreneurial characteristics required for success. [U] / CO1
15. Discuss the legal and ethical implications in bioentrepreneurship. [E] / CO2
16. Explain the importance of branding and marketing strategies in bioentrepreneurship. [E] / CO2

17. Write notes on the role of the Indian Government in promoting bioentrepreneurship. [A] / CO3
18. Briefly explain entrepreneurship opportunities in environmental biotechnology. [E] / CO4

(4 × 5 = 20)

Part C

Essay questions

Answer any **2** questions.

Each question carries **15** marks

19. Discuss in detail the process of ideation, conceptualization, and research & development in bioentrepreneurship. How does resilience and adaptability contribute to small-scale product development? [U] / CO1
20. Write a detailed account on Intellectual Property Rights with special reference to patents, trademarks and copyrights. Evaluate their significance in protecting bio entrepreneurial innovations. [E] / CO2
21. Explain the various policies, initiatives, funding opportunities and grants available for bioentrepreneurs in India. How do foreign investments and global collaborations support the growth of biotechnology in India? [A] / CO3
22. Write an essay on specialized areas of bioentrepreneurship covering agricultural, medical, industrial and environmental biotechnology. Also discuss the global outlook of bioentrepreneurship. [E] / CO4

(2 × 15 = 30)

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MAHATMA GANDHI UNIVERSITY, KOTTAYAM
MGU-UGP (HONOURS) EXAMINATION OCTOBER 2026
FIFTH SEMESTER
ELECTIVE – MG5DSEBTG301- BASIC BIOINFORMATICS
(2024 ADMISSION ONWARDS)

Duration: 2 Hours

Maximum Marks: 70

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S)

Students should attempt at least one question from each Course Outcome to enhance overall outcome attainability.

Part A – One Word Answer Questions

Answer any 10 questions.

Each question carries 2 marks.

1. What computational discipline deals with the storage, retrieval and analysis of biological information? [U / CO1]
2. Which repository provides access to experimentally determined three-dimensional structures of proteins and nucleic acids? [K / CO2]
3. Identify the nucleotide sequence repository maintained by NCBI. [K / CO3]
4. Recognize the program is commonly used for comparative protein structure modelling. [K / CO3]
5. Name any one Phylogenetic Tree Construction tool. [U / CO4]
6. Recall the BLAST program designed to compare a nucleotide query sequence against a nucleotide sequence database. [K / CO3]
7. Write the term that denotes a continuous stretch of DNA that can potentially encode a protein. [K / CO3]
8. State the system used to determine the geographic position of an object on Earth. [K / CO4]

9. Mention the branch of genomics that deals with the influence of genetic variation on drug response. [K / CO4]
10. What term refers to the principles governing responsible conduct in bioinformatics? [K / CO4]
11. Write the full form of the term QSAR. [K / CO4]
12. What term refers to the principles governing responsible conduct in bioinformatics? [K / CO3]

(10 × 2 = 20 marks)

Part B – Short Essay Questions

Answer any 4 questions.

Each question carries 5 marks.

13. Summarize the basic workflow of Translation of an Unknown DNA Sequence. [U / CO2]
14. Describe the major functions of Homology Modelling and Related Bioinformatics Tools. [U / CO3]
15. Compare global and local sequence comparison methods with respect to their principles and applications. [An / CO3]
16. Analyse the differences among BLASTn, BLASTp and BLASTx and indicate a suitable application for each. [An / CO3]
17. Illustrate the major steps involved in pharmacophore-based drug design. [A / CO4]
18. Explain the applications of bioinformatics in basic biological research. [U / CO4]

(4 × 5 = 20 marks)

Part C – Essay Questions

Answer any 2 questions.

Each question carries 15 marks.

19. Explain the major goals and scientific contributions of the Human Genome Project. [U / CO1]
20. Demonstrate the biological databases into genomic, nucleotide sequence and protein databases with suitable examples. [A / CO2]
21. Design how dot matrix methods can be used to identify similarities and differences between biological sequences. [S/ CO3]

22. Analyse the major stages involved in molecular docking, from ligand selection and active-site identification to docking and result evaluation. [An / CO4]

(2 × 15 = 30 marks)

MAHATMA GANDHI UNIVERSITY, KOTTAYAM
MGU-UGP (HONOURS) REGULAR EXAMINATION OCTOBER 2026
FIFTH SEMESTER
ELECTIVE – MG5DSEBTG302 BIOPROCESS TECHNOLOGY
(2024 ADMISSION ONWARDS)

Duration: 2 Hours

Maximum Marks: 70

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)

Students should attempt at least one question from each course outcome to enhance their overall outcome attainability.

Part A – One word answer - Answer any 10 questions. Each question carries 2 marks

1. Name the scientist who discovered fermentation. [K] / CO1
 2. What is the primary screening technique used to isolate antibiotic producing organisms? [K] / CO2
 3. Give an example for a solid state fermentation. [K] / CO1
 4. Write any two examples for secondary metabolites. [K] / CO1
 5. Name the type of culture where critical components are added at regular intervals. [K] / CO1
 6. Define auxotrophs. [U] / CO2
 7. What is hybridisation? [U] / CO2
 8. Define inoculum media. [U] / CO3
 9. Cite an example for a precursor used in antibiotic production media [U] / CO3
 10. Name the common sterilisation technique used for the sterilisation of fermentation media. [U] / CO3
 11. Define baffles. [U] / CO3
 12. Name the salt used for the purification of proteins. [U] / CO4
- (10X2=20)

Part B- Short essay- Answer any 4 questions. Each question carries 5 marks

13. Describe auxanography. [A] / CO2
14. What are the applications of Bioprocess Technology? [A] / CO1

15. Write notes on fermentation . [U] / CO1
16. Explain the parts of a bioreactor. [U] / CO3
17. What are the different solid- liquid separation techniques used in downstream processing? [K] / CO4
18. Write in detail on the various cell immobilisation techniques. [A] / CO4
(4X5=20)

Part C- Essay- Answer any 2 question. Each question carries 15 marks

19. Write a detailed account on the various mutation techniques used in strain improvement. [A] / CO2
20. Write an essay on the different steps in downstream processing. [A] /CO3
21. Write notes on the fermentative production of penicillin. [K] / CO4
22. Write in detail different types of bioreactors. [A]/CO3
(2X15=30)

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MAHATMA GANDHI UNIVERSITY, KOTTAYAM

MGU-UGP (HONOURS) REGULAR EXAMINATION OCTOBER 2026

FIFTH SEMESTER

Discipline Specific Elective (DSE) - MG5DSEBTG303 – MARINE BIOTECHNOLOGY

(2024 ADMISSION ONWARDS)

Duration: 2 hours

Maximum Marks: 70

Remember(K), Understand(U), Apply(A), Analyse (An), Evaluate(E), Create(C), Skill(S), Interest(I) and Appreciation (A)

Students should attempt at least one question from each course outcome to enhance their overall outcome attainability

Part A

One Word Answer Questions

Answer any **10** questions

Each question carries **2** marks

1. Name the major pollutant responsible for marine plastic pollution. [An] / [CO4]
2. List the major levels of marine biodiversity. [R] / [CO1]
3. Which sampling method is used to collect organisms living on the ocean floor? [U] / [CO3]
4. List any two applications of marine biotechnology. [K] / [CO1]
5. Recall the name of the molecule in microalgae mainly used for biodiesel production. [An] / [CO2]
6. Which term refers to the establishment of protected areas for conserving marine species? [An] / [CO4]
7. What is called for the organisms adapted to high salt concentrations? [R] / [CO1]

- | | | |
|-----|---|-------------|
| 8. | Name any two microorganisms commonly found in extreme marine environments. | [R] / [CO2] |
| 9. | Which method is used to determine the concentration of microorganisms in a marine sample? | [U] / [CO3] |
| 10. | Mention one importance of genetic diversity in marine microorganisms. | [R] / [CO1] |
| 11. | What is CTD? | [U] / [CO3] |
| 12. | Name the marine photosynthetic organisms which form the base of many marine food chains. | [R] / [CO1] |

[2x10 = 20]

Part B

Short Essay Questions

Answer any **4** questions

Each question carries **5** marks

- | | | |
|-----|--|--------------|
| 13. | Explain the methods used for collecting marine microorganisms. | [U] / [CO3] |
| 14. | Compare insitu and exsitu conservation strategies for marine organisms. | [An] / [CO4] |
| 15. | Define marine biotechnology and state its scope by listing the major group of marine organisms. | [R] / [CO1] |
| 16. | Differentiate between plankton net and a sediment corer in sampling. | [U] / [CO3] |
| 17. | Analyse the major challenges associated with marine drug development. | [An] / [CO4] |
| 18. | Compare microbial diversity in different marine habitats and analyse the factors responsible for it. | [R] / [CO2] |

[5x4 = 20]

Part C

Essay Questions

Answer any **2** questions

Each question carries **15** marks

19. Explain the principle of DNA sequencing and its importance and applications in marine biotechnology. [U] / [CO3]
20. Compare the opportunities and challenges in utilizing marine biological resources. [An] / [CO4]
21. Examine the relationship between marine microbial diversity and the discovery of novel biotechnological products. [R] / [CO2]
22. Describe the techniques of sampling and role of analytical techniques in marine biology. [U] / [CO3]

[15x2 = 30]

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MAHATMA GANDHI UNIVERSITY, KOTTAYAM
MGU-UGP (HONOURS) REGULAR EXAMINATION OCTOBER 2026
FIFTH SEMESTER
SEC – MG5SECBTG300- Scientific Communication in Research
(2024 ADMISSION ONWARDS)

Duration: 1.5 Hours

Maximum Marks: 50

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)

Students should attempt at least one question from each course outcome to enhance their overall outcome attainability.

Part A

One word answer

Answer any **10** questions.

Each question carries **2** marks

- | | |
|--|-------------|
| 1. What is Science? | [K] / [CO1] |
| 2. Define Hypothesis. | [U] / [CO1] |
| 3. What is a Journal? | [K] / [CO3] |
| 4. Define impact factor. | [K] / [CO3] |
| 5. What is a review paper? | [K] / [CO2] |
| 6. What is Plagiarism? | [K] / [CO4] |
| 7. List any 2 journal evaluation tools. | [U] / [CO3] |
| 8. What do you mean by an abstract. | [K] / [CO2] |
| 9. What is an Open Access Databases. | [U] / [CO4] |
| 10. What is null hypothesis? | [K] / [CO1] |
| 11. Give the structure of scientific report. | [K] / [CO1] |
| 12. What is deductive reasoning ? | [U] / [CO1] |

(10X2= 20)

Part B

Short essay

Answer any **5** questions.

Each question carries **4** marks

- | | |
|--|-------------|
| 13. How to test a hypothesis. | [U] / [CO1] |
| 14. Give an account of different forms of scientific writing. | [K] / [CO2] |
| 15. Give an account of major indexing databases. | [U] / [CO2] |
| 16. How synopsis is prepared. | [U] / [CO1] |
| 17. Write the benefits and challenges of open access publishing. | [K] / [CO3] |
| 18. Mention the ethical issues related to scientific publishing? | [U] / [CO4] |

(4X5=20)

Part C

Essay

Answer any **1** question.

Each question carries **10** marks

19. Write an essay on types and forms of scientific communication [U] / [CO1]
20. Write an essay on citation analysis as a measure of research impact [U] / [CO2]

(1X10=10)