PH 501.3

Reg. No. | | | | | | |

St Aloysius College (Autonomous)

Mangaluru

Semester III – P.G. Examination - M.Sc. Biotechnology

November – 2024

ANIMAL BIOTECHNOLOGY

Time: 3 Hours **Max. Marks: 70**

Note: Draw neat labeled diagrams/schematic sketches/structures wherever necessary.

I. Write short notes on any FIVE of the following: **(5x3=15)**

1. What do you understand by cell cloning? List out its applications.
2. Name two techniques which employs differences in cell size to separate cells.
3. List the agents which synchronize the cells in the M phase of the cell cycle.
4. Explain how somatic cell hybridization helping in gene mapping.
5. Write short notes on HeLa cell line.
6. Advantages of cell culture based methods for viral vaccine production as compared with egg based method.
7. List the two main methods for reproductive cloning.
8. What are the techniques for gene silencing?

II. Write explanatory notes on any FIVE of the following: **(5x5=25)**

9. Discuss on tissue engineering of skin.
10. Explain the production of human growth hormone in animal cell culture systems.
11. Discuss briefly the improvement of female reproduction in cattle.
12. Discuss on detection of mycoplasma contamination and eradication.
13. Discuss on cell separation techniques.
14. Comment of the properties of embryonic stem cells.
15. Discuss the strategies for production of fish cell lines, Add a note on its applications.
16. Explain the steps involved in *in vitro* fertilization.

III. Answer any THREE of the following: **(3x10=30)**

17. Discuss the steps involved in the development of cell banks for a particular cell line.
18. Discuss the various techniques of histotypic cultures. Add a note on its applications.
19. Elaborate on the production of tissue plasminogen activator using mammalian cell culture system.
20. Give an account of transgenic cattle and its applications.
21. Discuss the effects of temperature, pH, osmolarity, CO_2 levels and substratum on mammalian cell growth.

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Mangaluru
Semester III – P.G. Examination - M.Sc. Biotechnology
November – 2024

PLANT BIOTECHNOLOGY

Time: 3 Hours **Max. Marks: 70**

Note: Draw neat labeled diagrams/schematic sketches/structures wherever necessary.

I. Write short notes on any FIVE of the following: (5x3=15)

1. Name one common method used for encapsulating artificial seeds.
2. Describe the role of brassinosteroids in promoting plant tissue culture growth.
3. Define embryo culture in plant tissue culture.
4. Define hairy root culture and its significance in plant tissue culture.
5. Explain the primary objective of conducting RAPD analysis in plants.
6. What does SCAR stand for in plant genetics research?
7. What is Golden Rice and mention its usefulness?
8. What are the genetic modification strategies employed to create plants resistant to fungal diseases.

II. Write explanatory notes on any FIVE of the following: (5x5=25)

9. Discuss the differences between somatic embryogenesis and zygotic embryogenesis in plants.
10. Describe some of the challenges and restrictions relating to explant sterilisation in plant tissue culture.
11. Discuss how biotransformation processes can be applied to modify secondary metabolite production.
12. Compare and contrast the techniques of shoot tip culture and nodal culture in micropropagation.
13. Write a note on synteny mapping and its applications.
14. Illustrate the application of cisgenesis/intragenesis in crop improvement.
15. Explain the principles and mechanisms of TALEN-mediated gene editing.
16. Describe the development and characteristics of BT cotton and BT brinjal.

III. Answer any THREE of the following: (3x10=30)

17. Describe the function of growth regulators, with a focus on auxins and cytokinins, in plant tissue culture. Describe in detail the natural and synthetic auxins and cytokinins that are employed in plant tissue culture.
18. Discuss the applications and potential benefits of somatic hybrids and cybrids in agriculture or horticulture.
19. Compare and contrast the advantages of SNP analysis over traditional marker techniques like RFLP or AFLP.
20. Explore the potential benefits and challenges of Seed Terminator Technology and how it works.
21. Explain the concept of a "quantitative trait" and provide examples of traits that are amenable to QTL mapping.

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Semester III – P.G. Examination - M.Sc. Biotechnology

November – 2024

INDUSTRIAL BIOTECHNOLOGY

Time: 3 Hours **Max. Marks: 70**

Note: Draw neat labeled diagrams/schematic sketches/structures wherever necessary.

I. Write short notes on any FIVE of the following: (5x3=15)

1. Mention the advantages of continuous sterilization over batch sterilization.
2. Mention various types of continuous filters.
3. How does gas-liquid mass transfer occur in an air-lift fermentor?
4. Describe the role of impellers in the agitation process of a fermentor.
5. Differentiate between co-current and counter current flow extraction system.
6. What are the key factors that influence the choice of a recovery process in bioprocessing?
7. What is drying in the context of industrial processes, and why is it an essential step in various industries? Provide a basic explanation of the drying process.
8. Can you explain the mechanism by which antifoams work to control foam formation?

II. Write explanatory notes on any FIVE of the following: (5x5=25)

9. Explain the key phases of microbial growth in a batch culture.
10. Explain the role of growth factors and precursors in media formulation.
11. Explain different classes of sensors used in fermentors.
12. Apply the principles of aseptic technique to describe how to prevent contamination in a fermentor.
13. Discuss the characteristic features of antifoams. Give examples.
14. Explain the underlying mechanisms that lead to cell aggregation and flocculation in a bioprocess. What factors contribute to the clustering of cells, and why is it important to control these processes?
15. Compare and contrast traditional manual control of bioprocesses with computer-aided control systems.
16. Analyze the advantages and limitations of mechanical cell disruption techniques, such as agitation with abrasives and ultrasonication.

III. Answer any THREE of the following: (3x10=30)

17. Explain the design of fermentation media.
18. Compare and contrast the roles of proportional, integral, and derivative actions in PID control as applied to a fermentor system.
19. Explain industrial production of riboflavin using microorganisms.
20. Discuss the Isolation and improvement of industrially important strains by recombinant techniques.
21. Analyze the role of filter aids in filtration. Explain the different types of batch filters.

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Semester III – P.G. Examination - M.Sc. Biotechnology

November – 2024

ENVIRONMENTAL BIOTECHNOLOGY

Time: 3 Hours **Max. Marks: 70**

Note: Draw neat labeled diagrams/schematic sketches/structures wherever necessary.

I. Write short notes on any FIVE of the following: **(5x3=15)**

1. Describe the ecosystem of the Savanna.
2. Describe figs as keystone species.
3. Explain Minamata incident as a classic example of bioaccumulation.
4. How does a low shear airlift reactor facilitate biological treatment in waste water?
5. Identify the sources of air pollution.
6. What types of micro organisms are commonly found in biofilm?
7. List the main components of a fluidized bed reactor.
8. What are the typical conditions required for optimal microbial activity in copper leaching?

II. Write explanatory notes on any FIVE of the following: **(5x5=25)**

9. Compare the mangrove ecosystem with that of the coral reef.
10. Elaborate on the different zones of the atmosphere.
11. Compare and contrast competition as an interspecific interaction with that of mutualism and parasitism.
12. Assess the sources, effects and prevention methods of water pollution.
13. Explain the steps and significance of EIA.
14. Explain the principles and benefits of using aerated lagoons in ex-situ bioremediation.
15. Explain the role of bacteria in the process of microbial influenced corrosion.
16. Write a note on principle and working mechanisms of Air sparged bed reactor.

III. Answer any THREE of the following: **(3x10=30)**

17. Elaborate on the types of food chain with suitable examples. Add a note on the concept of 10% energy law.
18. Elaborate on any two anaerobic biological treatment processes.
19. Differentiate between intrinsic and engineered in-situ bioremediation and provide an example of in-situ bioremediation.
20. Describe the different types of petroleum hydrocarbons and their susceptibility to microbial degradation.
21. Elaborate on the structure, lifecycle, interaction and degradation mechanism of biofilm.

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