|  |  |  |
| --- | --- | --- |
| 1 | What is biotechnology? Give various definitions of “Biotechnology”? | №1 |
| 2 | Describe the history of microbial biotechnology? | №1 |
| 3 | Can you explain review the applications of microbial biotechnology in Modern World? | №1 |
| 4 | Describe the petroleum based Chemical industry vs. Biobased Green industry? | №1 |
| 5 | Describe the Fermentation process in Biotechnology? | №1 |
| 6 | Can you explain Good Manufacturing Practices (GMP) and Good Laboratory Practices (GLP)? | №1 |
| 7 | What is Bioprocessing? | №1 |
| 8 | Describe the artificial conditions for cultivation of plant cells. | №1 |
| 9 | Describe clonal micropropagation of plants and its advantages | №1 |
| 10 | Point the ways of plant cells morphogenesis in vitro | №1 |
| 11 | What do you know about subject and methods of Animal Biotechnology? | №1 |
| 12 | Classify the bioethics issues in Animal biotechnology and give an explanation of these? | №1 |
| 13 | Describe the main stages in the development of Animal biotechnology? | №1 |
| 14 | What do you know about applications of Animal biotechnology in Modern World? | №1 |
| 15 | Describe the 3 types of biotechnology transformed Animals: allophenic (chimeras), cloned, and transgenic animals | №1 |
|  |  |  |
| 1 | How to explain bioreactors and their classification? | №2 |
| 2 | Describe the fermentation systems and metabolic pathways? | №2 |
| 3 | Explanation to the basic characteristics of industrially important bacteria species? | №2 |
| 4 | Expand upstream processing? | №2 |
| 5 | How to explain Membrane Filtrations? | №2 |
| 6 | What do you know about the use of plant cell culture for industrial production of biomass and BAS | №2 |
| 7 | Describe factors affecting on the process of plant micropropagation | №2 |
| 8 | Expand the use micropropagation technology of plants and its prospects | №2 |
| 9 | Describe the vector systems used for plant transformation | №2 |
| 10 | What do you know about culture of apical meristems | №2 |
| 11 | Point the stem cells properties. What do you know about differences between embryonic and adult stem cells? | №2 |
| 12 | What do you know about the potency properties of animal cells? Give a classification of potency. | №2 |
| 13 | Give a definition of allophenic animal (chimera) and describe the methods of creating chimeras. | №2 |
| 14 | Give a definition of genetic cloning and describe the differences between the gene cloning and organism cloning. | №2 |
| 15 | How do you understand the genetic transformation of animals at the cell, organism, or strain (population) levels? | №2 |
|  |  |  |
| 1 | Expand the substrate (feedstock) in Biotechnology: starch based biomass and sugar based biomass. | №3 |
| 2 | Draw a bioreactor/fermenter design. | №3 |
| 3 | Describe the isolation of End Masses as Fermentation Products. | №3 |
| 4 | Expand the methods used for the separation and concentration of microbiological synthesis products. | №3 |
| 5 | Expand the Upstream bioprocessing, Downstream bioprocessing  and Bioprocess engineering. | №3 |
| 6 | Describe on scheme the Photo-Bioreactors and Bubble Column Bioreactors design and work principle. | №3 |
| 7 | Describe on scheme the Airlift Bioreactors, Fluidized Bed Bioreactors, and Continuous Stirred Tank Bioreactors design and work principle. | №3 |
| 8 | Present on scheme the Alcoholic, Lactic, Butyric-acid, and Acetone-butyl alcohol fermentations. | №3 |
| 9 | Present on scheme the Propionic-acid, Acetic-acid, Acetone-butyl alcohol fermentations, and Fermentation of proteins. | №3 |
| 10 | Present on scheme the Fermentation of proteins. | №3 |
| 11 | Present on scheme the methods of plant clonal micropropagation | №3 |
| 12 | Present on scheme the methods of diagnosis of infected plants | №3 |
| 13 | Explain the obtaining virus-free planting material | №3 |
| 14 | Give a plan of protoplast fusion techniques and plant regeneration from cultivated protoplasts | №3 |
| 15 | Point the ways of use of somatic hybridization in plant breeding | №3 |
| 16 | Present on scheme the methods for analysis of hybrid plants | №3 |
| 17 | Present the main steps of gene transfer methods into genome of plants | №3 |
| 18 | Present the main steps of cryopreservation techniques for Plant cells | №3 |
| 19 | Describe on scheme the Androgenesis methods in plants biotechnology | №3 |
| 20 | Describe on scheme the Ginogenesis method in plants biotechnology | №3 |
| 21 | Place of animal biotechnology in the system of Biological Sciences using the scheme. | №3 |
| 22 | Draw the schemes of getting the chimeras: embryonic aggregation method and method of injection of embryonic cells into blastocyst. | №3 |
| 23 | Draw the full schemes of getting the cloned amphibians (Rana redibunda, Xenopus laevis). | №3 |
| 24 | Draw the full scheme of getting the cloned mammals using the nuclear transfer method. | №3 |
| 25 | Present the 3 main approaches to obtain the transgenic animals on the scheme. Describe the аdvantages and disadvantages. | №3 |
| 26 | Present on the scheme the various methods of reproduction and saving the Animals. Point the application areas. | №3 |
| 27 | Describe the general principles for design of transgenes expressed in mammalian cells. | №3 |
| 28 | Using the scheme, describe the main stages of the artificial fertilization of animals and humans. | №3 |
| 29 | Draw a scheme of getting the transgenic birds. Point the main application directions. | №3 |
| 30 | Draw a scheme of getting the transgenic cattle. Point the main application directions. | №3 |