

TOPICS FOR BECHELOR EXAM

1. Eukaryotes vs Prokaryotes (Bacteria and Archaea) - cell structure.
2. Structure and function of cell components.
3. Structure and functions of biological membrane.
4. Structure and functions of:
 - proteins,
 - carbohydrates,
 - lipids,
 - nucleic acids.
5. Structure and functions of coenzymes and vitamins.
6. The role of water in biological systems.
7. Protein synthesis and degradation.
8. Modification of protein biological activity.
9. Mechanism of enzyme action.
10. Regulation of enzymatic activity.
11. Enzyme inhibition.
12. Enzymatic and receptor kinetics.
13. Basics of bioenergetic processes.
14. Metabolic pathways for cellular energy.
15. Integration of metabolism.
16. Cell regulatory pathways (kinase A system, kinase C system, receptor and non-receptor tyrosine kinases, tri- and monomeric GTP-ases).
17. Replication and expression of genetic information.
18. Regulation of gene expression.
19. Mechanisms of DNA damage, repair, and mutagenesis.
20. Mendelian laws of inheritance.
21. Genetic recombination and translocation elements.
22. Transmission of genetic material in organisms (transformation, transduction, conjugation)
23. Basics of human immunology.
24. Tumorigenesis (proto-oncogenes, oncogenes and suppressor genes).
25. Biochemical processes unique for Prokaryotes.
26. Virulence factors of bacterial pathogens.
27. Microorganisms in biotechnology.
28. Examples of biotechnology products.
29. Genetically modified organisms in agriculture and industry.
30. Biochemical calculations and basic concepts of statistics.
31. Physical methods in biochemical and bio-physical processes.
32. Preparation and analysis of macromolecules (experiment design, performance and analysis of results).
33. Molecular biology methods:
 - restriction analysis,
 - vectors,
 - DNA cloning,
 - PCR,
 - RT-PCR,
 - Northern and Southern hybridization,
 - genomic and cDNA libraries,
 - expression of recombinant proteins.
34. Molecular biology methods for diagnostics and genetic engineering.
35. Animal and plan cell cultures techniques.
36. Microbiological culture media preparation and sterilization.