**TOPICS FOR BECHELOR EXAM**

**TOPICS FOR AN INTERVIEW FOR GRADUATE STUDIES**

BIOTECHNOLOGY

1. Cell components, their biochemical and biophysical functions

2. Structure and functions of biological membrane

3. Physical methods used in biochemical and bio-physical processes

4. Structure and function of proteins

5. Structure and function of lipids

6. Structure and function of nucleic acids

7. Role of water in biological systems

8. Basics of bioenergetic processes

9. Molecular biology methods in diagnostics and genetic engineering

10. Enzymatic and receptor kinetics

11. Cell regulatory pathways (kinase A system, kinase C system, receptor and non-receptor

tyrosine kinases, tri- and monomeric GTP-ases)

12. Introduction to tumorogenesis (protooncogenes, oncogenes and suppressor genes)

13. Expression of genetic information and its regulation in prokaryotes and eukaryotes

14. Mutagenesis and DNA repair processes

15. Basic methods of molecular biology (restriction analysis, types of vectors, DNA cloning, PCR, RT-PCR, Northern and Southern hybridization, genomic and cDNA libraries, expression of recombinant proteins)

16. Mechanism of action of enzymes and their inhibitors.

17. Types of regulation of enzymatic activity

18. Structure and function of carbohydrates

19. Coenzymes and vitamins

20. Integration of metabolic processes

21. Protein biosynthesis and protein degradation

22. Microorganisms in biotechnological processes

23. Methods of modification of protein biological activity

24. Role of genetically modified organisms in agriculture and industry

25. Metabolic pathways for cellular energy

26. Animal and plan cell cultures

27. Preparation and analysis of macromolecules (design, performance and analysis of results)

28. Biochemical calculations and basic concepts of statistics

29. Basic differences in cell structure of Eukaryotes, Bacteria and Archea

30 Main features of microbial media and methods of their sterilization

31 Biochemical processes carried out only by prokaryotic organisms

32. Main features of bacteria determining their virulence

33 Genetic recombination and translocation elements

34 Transmission of genetic material in organisms (transformation, transduction, conjugation)