Biotechnology

Introduction to Biotechnology.

1. Biotechnology can be helpful in the field of medicine and achieving sustainable agriculture. Put your views on this statement with the help of suitable examples.

Applications of biotechnology in the field of medicine.

i) Production of vaccines:

- Used in production of various types of vaccines against rabies, small pox, polio, hepatitis, measles, etc.

ii) Production of interferons:
- Recombinant DNA technology is used to develop interferons against viral diseases.

iii) Production of human insulin:
- Due to genetic engineering, human insulin has been produced.

iv) Production of antibiotics:
- Genetic engineering has been employed for production of various types of antibiotics like penicillin, streptomycin, tetracycline, etc.

Applications of Biotechnology in the field of agriculture:

i) Micropropagation:

- Rapid vegetative multiplication of plants for agriculture, horticulture and forestry.
- Beneficial for production of large number of plant or plantlets in short period of time in a small space.

ii) Production of virus free plants:

- Through meristem-tip culture and callus culture, virus free crop and ornamental plants are being produced.

-Technique of recombinant DNA technology is used in producing disease and pest resistant varieties of plants.

iii) Plant breeding:
-Used to obtain crops with higher yield, better quality, resistance to disease as well as adverse environmental condition, shorter duration of maturity, enhance nutritional quality, development of traids that are useful for storage and processing of food, etc.

iv) Biofertilizers:
-Natural fertilizers that contain

living microorganism, which enhance the nutrient quality of soil.
- Unlike chemical fertilizers, biofertilizers offer a sustainable and eco-friendly way to improve soil fertility and crop yields.

2. Describe the application of fermentation technology in industries. (4 marks) (2077)
- Incomplete oxidation of sugar into alcohol and CO_2:

Fermentation.
- Process of fermentation is extra cellular process which

takes place by groups of microorganism like yeast.
- Many fermented products are preserved with extension of shelf life.
- Most common groups of microorganisms involved in food fermentation are bacteria, yeast and molds.
- Microbial enzymes also play an important role in food fermentation.
- Food fermentation uses microorganisms to produce alcoholic beverages (beer, wine), leavened bread, organic acids (lactic, citric, acetic acid), and industrial enzymes (amy

lases, proteases, lipases), enhancing flavor, preservation and product quality across various industries.

- Fermented food play an important role in improving food security, increasing income and employment, etc.
- Fermentation influenced by numerous factors, including moisture, temperature, dissolved O_2 concentration and disolved CO_2.
- Fermentation preserves perishable raw materials.