FACULTY OF ENGINEERING &TECHNOLOGY
DEPARTMENT OF BIOTECHNOLOGY

SELECTABLE MARKERS

➢A **selectable marker** is a gene introduced into a cell, especially a bacterium or to cells in culture, that confers a trait suitable for artificial selection.

➢This element is required for the maintenance of the plasmid in the cell.

➢ Due to the presence of the selective marker, the plasmid becomes useful for the cell.

➢Under the selective conditions, only cells that contain plasmids with the appropriate selectable marker can survive.

➢Genes that confer resistance to various antibiotics are used as selective markers in cloning vectors.

➢**The drawbacks of this approach are:**

1. loss of selective pressure as a result of antibiotics degradation and inactivation.

2. contamination of the product or biomass by antibiotics, which may be unacceptable from medical or regulatory considerations.

Examples of selectable markers include:

➢Beta-lactamase which confers ampicillin resistance to bacterial hosts.

➢Neo gene from Tn5, which confers resistance to kanamycin in bacteria and geneticin in eukaryotic cells.

➢Mutant FabI gene (mFabI) from *E. coli* genome, which confers triclosan resistance to the host.

➢*URA3*, an orotidine-5' phosphate decarboxylase from yeast is a positive and negative selectable marker.

➢It is required for uracil biosynthesis and can complement *ura3* mutants that are auxotrophic for uracil (positive selection).

➢ The enzyme URA3 also converts 5-fluoroorotic acid (5FOA) into the toxic compound 5-fluorouracil, so any cells carrying the *URA3* gene will be killed in the presence of 5FOA (negative selection).