

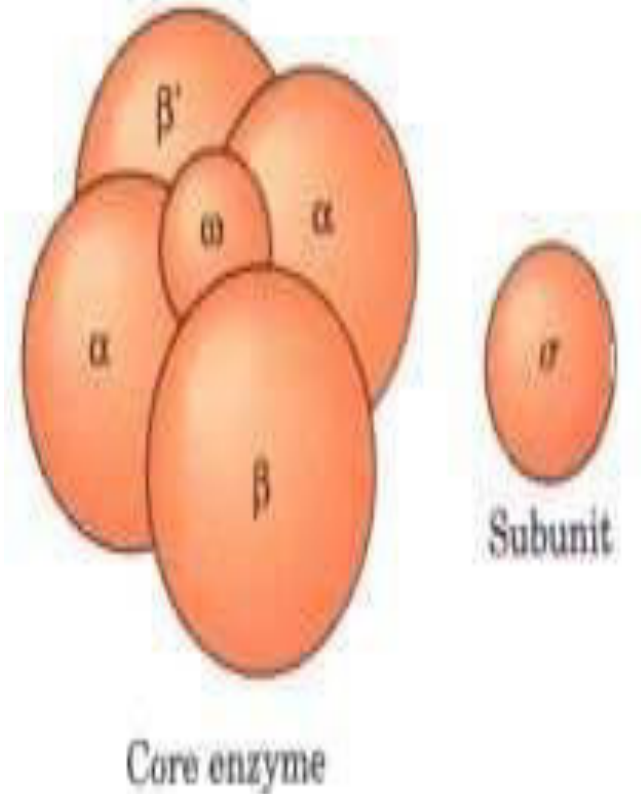


FACULTY OF ENGINEERING & TECHNOLOGY  
DEPARTMENT OF BIOTECHNOLOGY

# Bacterial DNA-Dependent RNA Polymerase

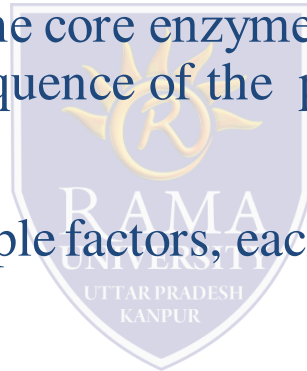
The DNA-dependent RNA polymerase (RNAP) of the bacterium *Escherichia coli* exists as an approximately 400 kDa core complex consisting of-

- two identical  $\alpha$  subunits,
  - similar but not identical  $\beta$  and  $\beta'$  subunits, and
  - an  $\omega$  subunit and a sigma subunit ( $\sigma$ )
- Beta is thought to be the catalytic subunit.



# Bacterial DNA-Dependent RNA Polymerase

- RNAP, a metalloenzyme, also contains two zinc molecules.
- The core RNA polymerase associates with a specific protein factor (the sigma  $\sigma$  factor) that helps the core enzyme recognize and bind to the specific deoxynucleotide sequence of the promoter region to form the preinitiation complex (PIC)
- Bacteria contain multiple factors, each of which acts as a regulatory protein.



# Mammalian DNA-Dependent RNA Polymerases

Mammalian cells possess three distinct nuclear DNA-Dependent RNA Polymerases

- RNA polymerase I is for the synthesis of r RNA
- RNA polymerase II is for the synthesis of m RNA and miRNA
- RNA polymerase III is for the synthesis of tRNA/5S rRNA, snRNA

