



# ANDHRA UNIVERSITY

## TRANS-DISCIPLINARY RESEARCH HUB

### PAPER1: MOLECULAR BIOLOGY AND VIROLOGY

#### UNIT I:

DNA Structure, Replication, Origin and direction of replication, Semidiscontinuous replication, DNA polymerases of prokaryotes and their mechanism of action; Primase, Ligase, Single strand DNA binding protein, Helicase, Topoisomerases. Replication strategies for replicating circular DNA: theta mode replication,  $\sigma$  mode or rolling circle replication and D-loop replication.

#### UNIT II:

DNA Repair mechanisms, Photoreactivation, Excision repair mechanism, Post replication repair mechanisms - recombination repair, mismatch repair system, SOS response, transcription-repair coupling

Different classes of RNA and their functions. RNA synthesis, Prokaryotic RNA polymerase, Conserved sequences of prokaryotic promoters, Initiation of transcription, Chain elongation, Chain termination and other post transcriptional modifications - processing and splicing.

#### UNIT III:

Mechanism of protein synthesis in prokaryotes - aminoacylation of tRNA, initiation, elongation and chain termination, Protein synthesis inhibitors.

Control of gene expression in prokaryotes- Structure and function of lac operon, Function and regulation of trp operon, Attenuation of trp operon.

#### UNIT IV:

Viruses- classification, structure and replication of Bacteriophages. Regulation of lytic phase and lysogenic phase of Bacteriophage  $\lambda$ . Replication of animal viruses. SV40 and Retroviruses in transformation.

#### UNIT V

Methods of assay and cultivation of viruses- chicken embryo, animal inoculation and tissue culture, quantification and propagation. Maintenance of animal and plant viruses. Tumor viruses.

Viral diseases – Dengue, Hepatitis, HIV, Polio, Rabies, SARS-COV2, Inactivation of viruses – photodynamic inactivation. Antiviral agents chemical and biological agents.

#### Reference Books

1. "Molecular Biology of the gene" by Waston et al 4th ed.
2. "Genes VI" by Benjamin Lewis
3. Biochemistry and Molecular biology, William H. Elliott and Daphne C. Elliott, Third Edition, Indian edition, Oxford University press, 2005
4. "General Virology" by Luria & Darnell
5. "Biochemistry" by Stryer

