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Dr. Syed Salman Ahmad Warsi is an accomplished physicist, academician, and educator with extensive expertise in condensed matter physics. He currently serves as an Associate Professor in the Department of Physics at Integral University, Lucknow, and brings more than 25 years of experience in teaching, research, and academic mentorship.

Throughout his academic career, Dr. Warsi has taught undergraduate and postgraduate students, making significant contributions to physics education through his dedicated teaching and research guidance. He has successfully supervised numerous B.Sc. and M.Sc. dissertations and projects and is actively involved in mentoring doctoral scholars pursuing Ph.D. research in Physics.

His research interests include liquid-crystal systems, nanoscale materials, and contemporary topics in condensed matter physics. Dr. Warsi has published several peer-reviewed research papers in reputed journals and continues to contribute actively to scientific research and academic development.

In addition to his research contributions, Dr. Warsi has co-authored important educational books, including:

- *ICSE Physics for Class X (2025)*
- *ISC Practical Physics for Classes XI & XII (2021)*

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- *Characterization of Liquid Crystals and Photonic Crystals (2022)*
- *Advances in Contemporary Physics: High Energy, Cosmology and Soft Matter(2025)*

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CHAPTER - 9

THERMODYNAMIC INVESTIGATION OF DRUG – DNA INTERACTIONS

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Drug–DNA interactions play a central role in chemotherapy, antimicrobial therapy, and rational drug design. This study highlights the structural features of DNA, including major and minor grooves, and explains the principal mechanisms of drug binding such as covalent interaction, intercalation, groove binding, and electrostatic association. Special emphasis is given to the thermodynamic aspects governing binding affinity, stability, specificity, and spontaneity of drug–DNA complexes. Important experimental techniques including UV–Visible spectroscopy, fluorescence spectroscopy, circular dichroism, calorimetry, and viscosity measurements are discussed alongside computational approaches such as molecular docking and molecular dynamics simulations. Together, these methods provide comprehensive insights into drug–DNA recognition and stability.

INTRODUCTION:

Deoxyribose Nucleic Acid commonly abbreviated as DNA is a double-stranded, twisted ladder called a double helix. Each strand is made of repeating units called nucleotides, which are composed of a phosphate group, a deoxyribose sugar, and one of four nitrogenous [1]. The structural components of a DNA molecule include backbones and four base pairs. The sides of the "ladder" known as backbone consist of alternating phosphate groups and sugars connected by strong covalent bonds.The "rungs" of the ladder are formed by paired nitrogenous bases projecting inward from each backbone. These rungs are called base pairs that are Adenine (A), Thymine (T), Cytosine (C), and Guanine (G).The bases always pair specifically via weak hydrogen bonds. Adenine always pairs with thymine and cytosine always pairs with Guanine. The two