

5 <sup>th</sup> Semester	RCH5D006	COLLOID AND INTERFACIAL ENGINEERING	L-T-P 3-0-0	3 CREDITS
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**Module I: (12 hr)**

General introduction of colloids, interfaces, surfactants, and micellization. Intermolecular forces, van der Waals' forces (Keesom, Debye, and London interactions). Colloidal systems and colloidal stability (van der Waals' attraction and potential energy curves). Brownian motion and Brownian flocculation.

**Module II: (8 hr)**

Surface and interfacial tension and surface free energy. Surface tension for curved interfaces. Surface excess and Gibbs equation. Theory of surface tension, contact angle, and wetting.

**Module III: (16 hr)**

Thermodynamics of interfaces, thermodynamics of micelle and mixed micellar formation. Electrical phenomena at interfaces (Electrokinetic phenomena, Electrical double layer). Emulsion and micro-emulsion. General applications. Enhanced petroleum recovery, super hydrophobic and self-cleaning surfaces. Novel fabrication of nanostructured particles. Measurement techniques of surface tension, Contact angle, Zeta-potential, Particle size.

**Books:**

1. Principles of Colloid and Surface Chemistry, 3rd ed. by P C Hiemenz and R Rajagopalan, MerceL Dekker.
2. Introduction to Colloid & Surface Chemistry, 4th ed. by D J Shaw, Butterworth Heinemann.
3. Colloid and Surface Chemistry by P Somasundaran, CreateSpace Independent Publishing Platform.
4. Introduction to Applied Colloid and Surface Chemistry by GM Kontogeorgis and SK Iil, John Wiley & Sons.

**Digital learning resources:**

1. Introduction to Colloid and Interface Science and Engineering by Prof. A. Sharma, Department of Chemical Engineering, IIT Kanpur  
Link: <https://nptel.ac.in/courses/103/104/103104045/>