*Name* : .....

*Roll No.* : .....

*Invigilator's Signature* : .....

**CS/M.TECH(LT)/SEM-2/MLT-201/2010**

**2010**

# COLLOID AND SURFACE CHEMISTRY

*Time Allotted* : 3 Hours Full Marks : 70

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable.*

Answer any *five* questions. 5 × 14 = 70

1. a) What are Colloids ? Show how much the specific surface area of a colloidal dispersion increases as we subdivide a cubic cm of a substance into colloidal dimensions.

   b) Discuss the properties that are unique to colloidal dispersion.

2. a) Define "Colloidal Sol".

   b) Discuss the different methods used in the industry for the preparation and purification of Colloidal Sol.

3. a) What are Emulsions and what role does Emulsifiers play in the preparation of emulsions ?

   b) Discuss the different mechanisms of Emulsion break up.

4. a) Define "Surface Tension". Explain the role surface tension plays in the creation of new surface area of a liquid.

   b) Discuss the different methods available for the measurement of Surface Tension.

5. a) What are "Contact Angles" ? Discuss the role contact angles play in the formation of meniscus in a capillary and explain the existence of different types of Meniscus.

   b) For a Mercury filled glass tube in air at sea level, evaluate the capillary rise for a 100 nm glass tube using a contact angle of 140°. Use standard values of water and mercury properties.

6. a) How can you predict whether a particular material will spread over a surface ? Why is de-wetting important in surface coverage ?

   b) What is the minimum pressure required to convert a liquid mass into spherical shape ? In water purification it is required that all micro-organisms of size larger than 0.1 μm must be totally removed. Calculate the pressure required in an Ultra-Filtration Module to achieve this.

7. a) Differentiate between Absorption and Adsorption. Which operation is important in surface engineering and why ?

   b) Explain how the different Isotherms are derived, with specific reference to Freundlich Isotherm.

8. Write notes on any *two* of the following : 7 × 2

   a) Preparation and application of Nano-Emulsions

   b) Application of Colloids in Leather Technology

   c) Gold Number and its application

   d) HLB and its application

   e) Surface Excess Free Energy and definition of Surface Tension.