BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION MO/2022)

CLASS: **B.TECH** **SEMESTER: VII**
BRANCH: **CHEM. ENGG / CP&P** **SESSION: MO/2022**

SUBJECT: CL412 COLLOID AND INTERFACIAL SCIENCE

TIME: **03 Hours** **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

Q.1(a)	Define Stokes Einstein equation.	[2]
Q.1(b)	A spherical particle of 1cm in diameter is broken uniformly into a large number of spherical particles such that the diameter of each of the new particle is 1x10-7 m. Calculate the total surface area of new particle.	[4]
Q.1(c)	Give classification of biosurfactants. Illustrate the advantages and limitations of biosurfactants.	[4]
Q.2(a)	Define young Laplace equation.	[2]
Q.2(b)	Calculate surface tension of ethyl acetate at 293K having the parachor value 38.196 $X10^{-6}$ $kg^{1/4}$ $m^3s^{-1/2}mol^{-1}$. (Given density 0.9g/cc)	[4]
Q.2(c)	Sketch ∏ Vs A (surface pressure Vs molecular area) of stearic acid in Langmuir-Blodgett film balance.	[4]
Q.3(a)	Define is Tate's law.	[2]
Q.3(b)	The critical coagulation concentration for NaCl, $MgCl_2$, and $AlCl_3$ for negatively charged As_2S_3 colloids are 60mol/m^3 and 0.09mol/m^3 respectively. Verify Schulze Hardy rule.	[4]
Q.3(c)	Illustrate the advantages and disadvantages of Wilhelmy and du Nouy ring method.	[4]
Q.4(a)	Define Winsor classification of surfactants.	[2]
Q.4(b)	Discuss the main differences of emulsion and microemulsions.	[4]
Q.4(c)	Estimate the height of water inside a capillary tube of 0.75 mm radius. Take: γ= 72 mN/m and assume zero contact angle.	[4]
Q.5(a)	Explain the main features of Gemini surfactant.	[2]
Q.5(b)	Calculate the Hamaker constant for the fused quartz (1) -air (2)-tetradecane (3) system. Compare your results with the experimental value of $-0.5x10^{-20}$J. $A_H^{1,1}= 6.5x10^{-20}$ $A_H^{2,2}=0$J $A_H^{3,3}= 6.5x10^{-20}$	[4]
Q.5(c)	Derive Poisson Boltzman equation for colloidal system.	[4]

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