BITS, Pilani, KK Birla Goa Campus

FIRST SEMESTER 2022-2023

BITS F417 Microfluidics and its applications

Comprehensive Examination-Part A (Closed Book)

DATE: 21/12/2022 Time: 2:00-3:30 PM Maximum Marks: 35

Instructions:

- All parts of a question must be answered at a single place.
- Support your answer with neat sketches where ever necessary

1. Discuss on Laser Doppler Velocimetry measuring system with a neat sketch **[12 M]**

2. Determine the energy required for generating an electrolysis bubble with an approximated dimension of 200 μm x 100 μm x 28 μm. Compare it to a thermal bubble of the same size. The specific density of hydrogen and oxygen at 1 bar and 25 $^{\circ}$C are 0.08988 kg/m^3 and 1.429 kg/m^3 , respectively. The surface tension of water is assumed to be constant at 72 x 10^{-3} N/m. Enthalpy of formation of water is 285.83 kJ/kmol. The thermodynamic properties of liquid water at 1 bar are: ν (25 $^{\circ}$C) = 1.0029 x 10^{-3} m^3/kg, u (25°C) = 104.88 kJ/kg; and of vapor: ν (100 $^{\circ}$C) = 1.673 m^3/kg, u (25°C) = 2506.5 kJ/kg. **[9 + 3 = 12 M]**

3. Brief on the following
   a) Provide neat schematic for atleast two micromolding techniques
   b) Electrical double layer

[6 + 5 = 11 M]
